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POLLUTION OF SLOCUM CREEK, HAVELOCK NORTH CAROLINA

APPENDICES. A COOPERATIVE INVESTIGATION BY THE STATE OF NORTH CAROLINA, DEPARTMENT OF THE NAVY, AND THE FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

NATIONAL FIELD INVESTIGATIONS CENTER
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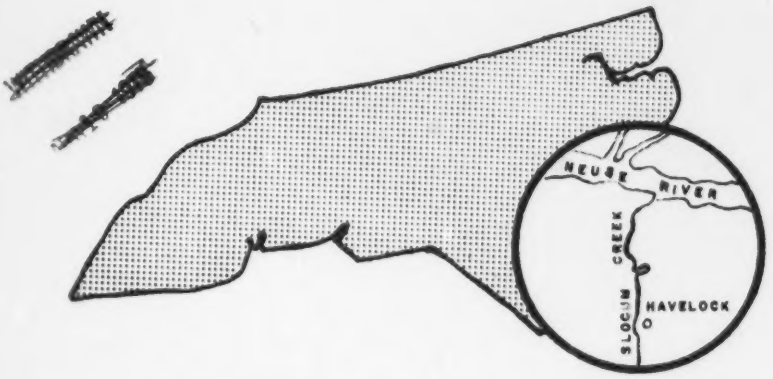

POLLUTION OF SLOCUM CREEK

HAVELOCK, NORTH CAROLINA

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Appendices to the report on stream pollution surveys of Slocum Creek near Havelock, North Carolina, are presented. The surveys examined the water quality since is affected bathing, fishing, and water skiing in the area. Data in these appendices deal with: waste water treatment conditions; dye tracer study; geologic and groundwater characteristics; sources of pollutants from the Naval Air Rework Facility; and the Pollutional Abatement Plant at Cherry Point. Most of the data are in tabular form.

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APPENDICES

POLLUTION OF SLOCUM CREEK
HAVELOCK, NORTH CAROLINA

A Cooperative Investigation by the
State of North Carolina
Department of the Navy
and the
Federal Water Pollution Control Administration

by

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Cincinnati, Ohio
November 1969

APPENDICES

A - Report of Wastewater Treatment Conditions in the Havelock, North Carolina Area

B - Dye Tracer Study of Slocum Creek

C - Summary of the Geologic and Groundwater Characteristics of the Ground-disposal Site, U.S. Marine Air Corps Cherry Point, North Carolina

D - Tabulated Data, Water Pollution of Slocum Creek, Havelock, North Carolina

E - Sources of Pollutional Material from Naval Air Rework Facility

F - Pollutional Abatement Plant, U. S. Marine Corps Air Station Cherry Point, North Carolina

APPENDIX A

Report of Wastewater Treatment Conditions in the Havelock, North Carolina Area

C. R. Smart, Jr., Regional Engineer
North Carolina Department of Water and Air Resources
Raleigh, North Carolina

1968

At the request of the Federal Water Pollution Control Administration a meeting was held on August 28 and 29, 1968, with Marine Corps Officials, and a representative of the North Carolina Department of Water and Air Resources at the Marine Corps Air Station at Cherry Point, North Carolina. It was a decision at this meeting that a thorough and complete study would be made by the cooperating agencies of water pollution in the Cherry Point - Havelock, North Carolina area, particularly as pollution relates to the Slocum Creek Watershed.

Slocum Creek lies within and is a part of the Neuse River Basin, the waters of which were classified by the North Carolina State Stream Sanitation Committee. A Resolution was adopted by the Committee on December 17, 1959, assigning classifications to all the waters within the River Basin with an effective date for application of the provisions of Sections 143-215.1 and 143-215.2 of the North Carolina General Statutes to become effective from and after April 1, 1960.

Slocum Creek and its tributaries were at that time assigned and at present have the following classifications:

	DESCRIPTION	CLASS	DESIGNATION
Slocum Creek	from source to Neuse River	SC	Swp. W.
Southwest Prong Slocum Creek	from source to Slocum Creek	C	Swp. W.
All Streams Tributary to Southwest Prong		C	Swp. W.
East Prong Slocum Creek	from source to Slocum Creek	C	Swp. W.
All Streams Tributary to East Prong		D	Swp. W.

That segment of the Neuse River to which Slocum Creek is tributary is classified SB Swp. W.

The following is a brief statement on each of the above classifications in reference to its best usage. A classification preceded by the letter "S" indicates a tidal water and generally those waters will have a natural chloride ion content in excess of 500 parts per million. A "Swp. W." designation is assigned to classifications of streams where the topographical location of the stream is such as to generally give the stream waters very low velocities and certain other characteristics which are different from adjacent streams draining steeper topography.

SB Swp. W.	Bathing and any other tidal salt water usage except shellfishing for market purposes
SC Swp. W.	Fishing and any other tidal salt water usage except bathing or shellfishing for market purposes

C	Fishing and any other use except for bathing or as a source of water supply for drinking, culinary or food-processing purposes.
D	Agriculture, industrial cooling and processing water supply, fish survival, navigation, and any other usage, except fishing, bathing, or as a source of water supply for drinking, culinary or food processing purposes.

During the last week of September and the first week of October, 1968, personnel of the FWPCA, TA&I Branch, Cincinnati, Ohio, conducted a study and sampling program at the Marine Air Station. The purpose of the program was to determine the characteristics of waste discharges, both before and after treatment, and the effect of the discharges on Slocum Creek.

North Carolina Department of Water and Air Resources personnel conducted similar studies during and since the latter week of September, 1968, to evaluate treatment plant efficiency, progress of pollution abatement activities, and all other factors in the Havelock area which might effect the water quality of Slocum Creek.

During the period of the study, the eastern North Carolina area was experiencing an extreme drought condition. Surface water runoff to the upper reaches of Slocum Creek was very low. Since the lower portion of Slocum Creek is tidal affected, those waters in the creek would tend to have been impounded longer than normally expected.

The Town of Havelock is immediately adjacent to the Marine Corps Air Station and to some extent has prospered due to the military installation. The Town is largely comprised of residences and retail business firms and according to the 1960 census had a population of 2,433 persons. The land within the corporate limits lies largely between the East Prong and West Prong of Slocum Creek. That portion of the West Prong, which forms the western corporate limit line, is tidal affected.

The wastewater treatment or disposal needs of the Town are handled as follows:

1. The larger portion of wastewater is disposed of by means of septic tank - nitrification line systems. The soil is in some instances incapable of absorbing the wastewater.

2. A few businesses and approximately 175 homes in Havelock Park are served by the subdivision's treatment facility. This consists of a collection system and Imhoff tank which discharges to the East Prong Slocum Creek approximately 2500 feet downstream from N. C. Highway 101. During the study of Slocum Creek by FWPCA personnel, the Imhoff tank was being by-passed in preparation to tying into the new municipal waste treatment system, and the discharge made directly to the stream. It was estimated, through water-use records, that the by-passing of the untreated wastewater contributed 75 pounds of biochemical oxygen demand per day to Slocum Creek.

3. In the main shopping center complex along the west right-of-way of U. S. Highway 70, several businesses, including a coin-operated laundry and a restaurant, are connected to the highway storm drain system. This storm drain system discharges to a small tributary which enters West Prong Slocum Creek at the U. S. Highway 70 bridge.

4. A mobile home park within the corporate limits contains 200 mobile homes and is served by a secondary type aeration waste treatment plant which discharges to the small tributary mentioned in the previous paragraph. Several retail businesses in an adjacent shopping center are also connected to the treatment plant. This facility is of 40,000 G.P.D. design capacity and is loaded near that figure. The biochemical oxygen demand of the plant effluent on September 26, 1968, was less than 10 mg/l.

5. A submerged pipe reportedly discharges to the West Prong Slocum Creek at a point approximately 100 feet downstream from the U.S. Highway 70 bridge. Upon investigation by personnel of this Department, neither the pipe, nor a potential water source to the pipe, could be found.

Permit Number 1151 was issued by this Department on February 3, 1967, to the Town of Havelock for the construction of approximately 70,000 lineal feet of sewers, three pumping stations, and a 0.5 M.G.D. contact stabilization waste treatment plant. Construction of these facilities is now complete and the plant was to be placed in operation on November 5, 1968. Mandatory connection to the system is required for all waste sources within the Town of Havelock. Incentives have been provided to those individuals making connections to the system within 60 days after start-up of the plant.

Within the watershed of Slocum Creek and outside the corporate limits of Havelock several mobile home parks and housing subdivisions are served by individual septic tank-nitrification line systems; however, investigation indicated that these systems would not constitute a significant pollution problem on Slocum Creek.

A commercial laundry is located approximately 1/2 mile north of Havelock on U. S. 70. An estimated 5,000 G.P.D. of wastewater from this business reaches the downstream portion of the West Prong Slocum Creek via roadside ditch and small tributary. The owner has taken initial steps toward adequately treating the wastewater.

Due to the low dissolved oxygen readings recorded upstream at West Prong crossing with Greenfield Boulevard an investigation was made above that point, particularly in relation to a report that possibly an upstream lake had been lowered, resulting in siltation of Slocum Creek. No pollution source was found upstream.

CONCLUSIONS:

1. The Town of Havelock now has a waste treatment plant of adequate design to treat the wastewater from within the corporate limits.

2. All waste sources, including the mobile home park, within the corporate limits should in the near future connect to the treatment system.

3. Until more information is available on the origin of the reported submerged line to West Prong Slocum Creek, the significance of this will remain in question.

4. The only significant wastewater source outside the corporate limits, with the exception of those possible sources on the Marine Corps Air Station which is being studied by the FWPCA, is that discharge from the commercial laundry on U. S. Highway 70 north of Havelock.

RECOMMENDATIONS:

1. Though it is felt that Havelock has in recent years made good progress toward pollution abatement in Slocum Creek, every effort should be made, as soon as possible, to connect all individual waste sources to the new system.

2. This Department should offer any assistance possible to the Havelock Officials in regard to connecting individual sources to the system or in the operation of the waste treatment facility.

3. Although the owner of the commerical laundry is initiating steps to adequately treat the wastewater from the business, this matter should be followed to completion.

APPENDIX B

Dye Tracer Study of Slocum Creek

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Physical and Engineering Sciences Section
National Field Investigations Center
Federal Water Pollution Control Administration

1968

INTRODUCTION

The main body of Slocum Creek begins at the confluence of the East Prong and the Southwest Prong and ends in the confluence with the Neuse River. It is a body of water about four miles long and ranges in width from about 0.1 miles just downstream from the joining of the prongs to about 0.7 miles approximately 1.0 miles upstream from the confluence with the Neuse River.

The mouth of Slocum Creek narrows from a width of about 0.5 miles to one of 0.06 miles at the point of entry into the Neuse River. This narrowing results from a jut of shoreline which constricts the channel. Since the width of the mouth is considerably smaller than that of the main body, there is probably less water interchange between the creek and the river than would be expected from the size of Slocum Creek.

Anderson Creek flows into Slocum Creek from the west bank about 0.5 miles from the mouth. About 1.0 miles from the mouth on the west bank and about 0.5 miles from the Anderson Creek inflow, Tucker Creek joins Slocum. The width at this point is about 0.7 miles which is the maximum width of Slocum Creek. There are several other minor streams draining into the creek, but, for the purposes of this discussion, they are not important.

The East and Southwest Prongs are slow-moving streams which drain swampy ground. The depth of these streams varies from 2 to 20 feet with the bottom generally observed to consist of a soft muck. The Prongs vary in width from about 50 to 100 feet. Each Prong has about one mile of length that is passable by boat.

Four waste discharges were considered for this dye study. Two, located about 200 feet apart on the west bank of the East Prong (around Station 24) approximately one mile upstream from the confluence with the Southwest Prong, are the discharges from the sewage systems of Slocum Village and the town of Havelock. A third waste, from the Pollution Abatement Plant for the industrial wastes produced by the operation of the Naval Air Rework Facility, discharges into Sandy Branch, a small tributary to the East Prong located about 0.7 miles above the confluence with the Southwest Prong. The fourth waste discharge is from the Cherry Point Marine Station Sewage Treatment Plant located on the east shore of Slocum Creek just above Slocum Bridge.

One very important point should be made. The study was made during drought flows and the results can only be considered valid for this and similar conditions.

DYE STUDY OF THE INDUSTRIAL WASTE TREATMENT PLANT EFFLUENT

On September 26, 1968, at 8:56 AM, one liter of Rhodamine WT dye was discharged into the mouth of the tributary (Sandy Branch) which receives the industrial waste treatment plant effluent from the Cherry Point Marine Air Base Pollution Abatement Plant. A recording fluorometer* was set up on the footbridge crossing the East Prong about 3,000 feet downstream.

Initially, the dye, which was visible at this point, moved upstream. Since the tidal picture is not clear, it is not certain whether the driving forces for this upstream movement had their origin in the lunar tide or in wind effects. At the time of the dye discharge, the wind was not observed to be blowing. It is possible, however, that wind tides on the Neuse River or the lower part of Slocum Creek could have been responsible for this effect. It took about an hour for significant amounts of dye to begin to move downstream.

Figure B-1 shows the dye curve at the footbridge. Dye first reached the bridge nine hours and ten minutes after the dose. As shown on the dye curve, the concentration rose to 2.6 ppb (parts per billion) and then began

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* G.K.Turner Fluorometer, Model 111 with a flowthrough door.

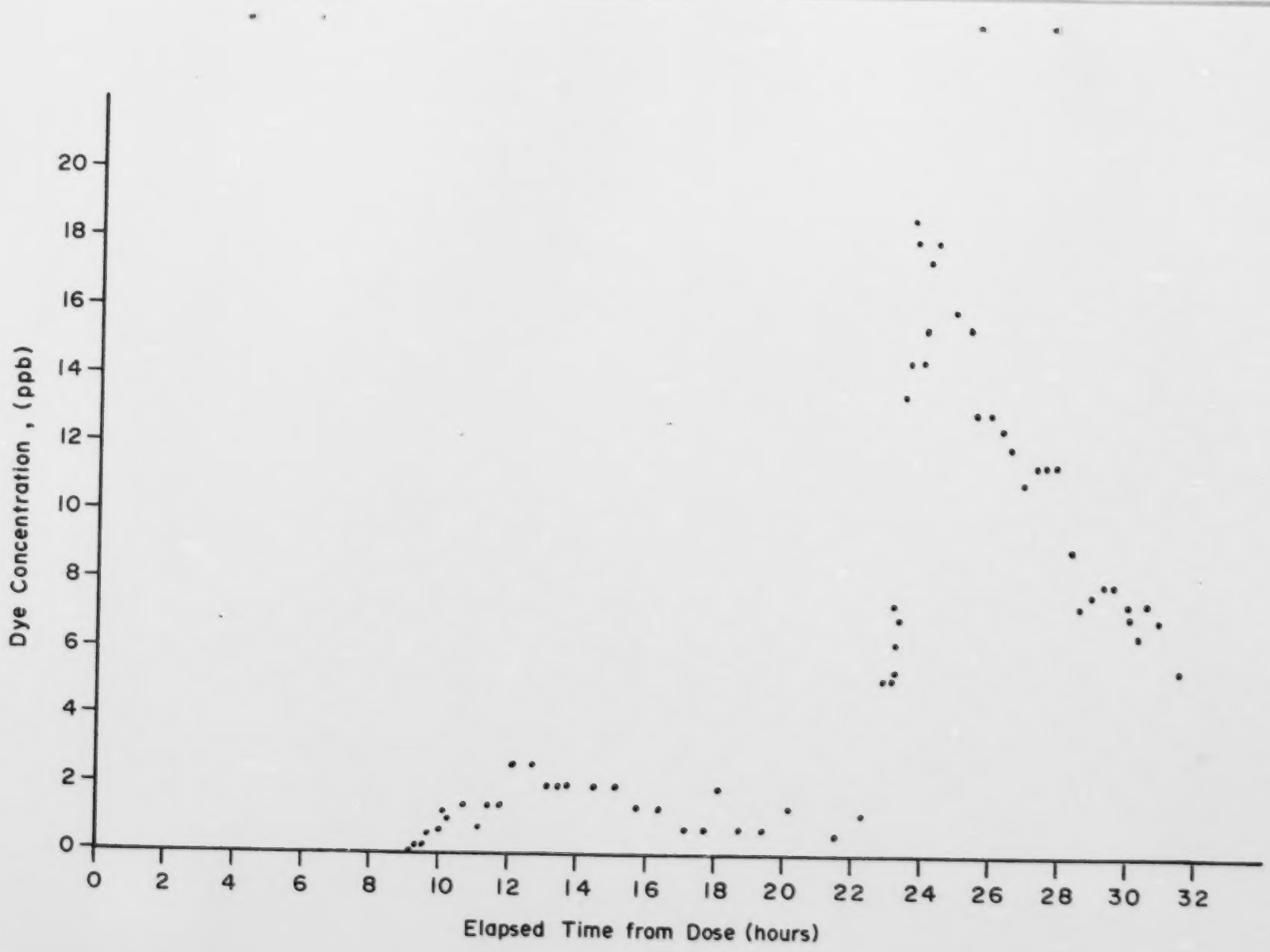

FIGURE B-1. DYE CONCENTRATIONS AT FOOTBRIDGE, (Station 14).

to decrease. Twenty-two hours after the dose, the main body of dye reached the bridge. Dye concentrations rose rapidly to 18 ppb and then decreased in an exponential fashion.

It was noted that the dye was highly stratified as it passed the footbridge. The greatest concentrations occurred in the upper four to six inches of water and decreased with increasing depth. The sampling depth was about one foot and varied slightly, due to water level fluctuations.

The net time of travel for the main dye body to advance the 3,000 feet from the point of injection to the footbridge was 22.5 hours. The term "net time of travel" is used because it is uncertain how long the main body of dye stayed upstream above the dose point. Using the net time of travel and the net displacement of 3,000 feet, the effective velocity was133 feet per hour, or 0.61 miles per day. The leading edge of the first peak required about nine hours to reach the bridge. This yielded a value for velocity of 333 feet per hour, or 1.52 miles per day.

The following afternoon (September 27, 1968) a survey of the creek by boat yielded the dye concentrations shown in Figure B-2. This was about 29 hours after the dose. About 6:00 PM, some 32 hours after the dose, a hard rain occurred which forced termination of the continuous recording at the footbridge. The next set of observations was obtained the following day (September 28, 1968) at about 10:00 AM. The pertinent results are displayed

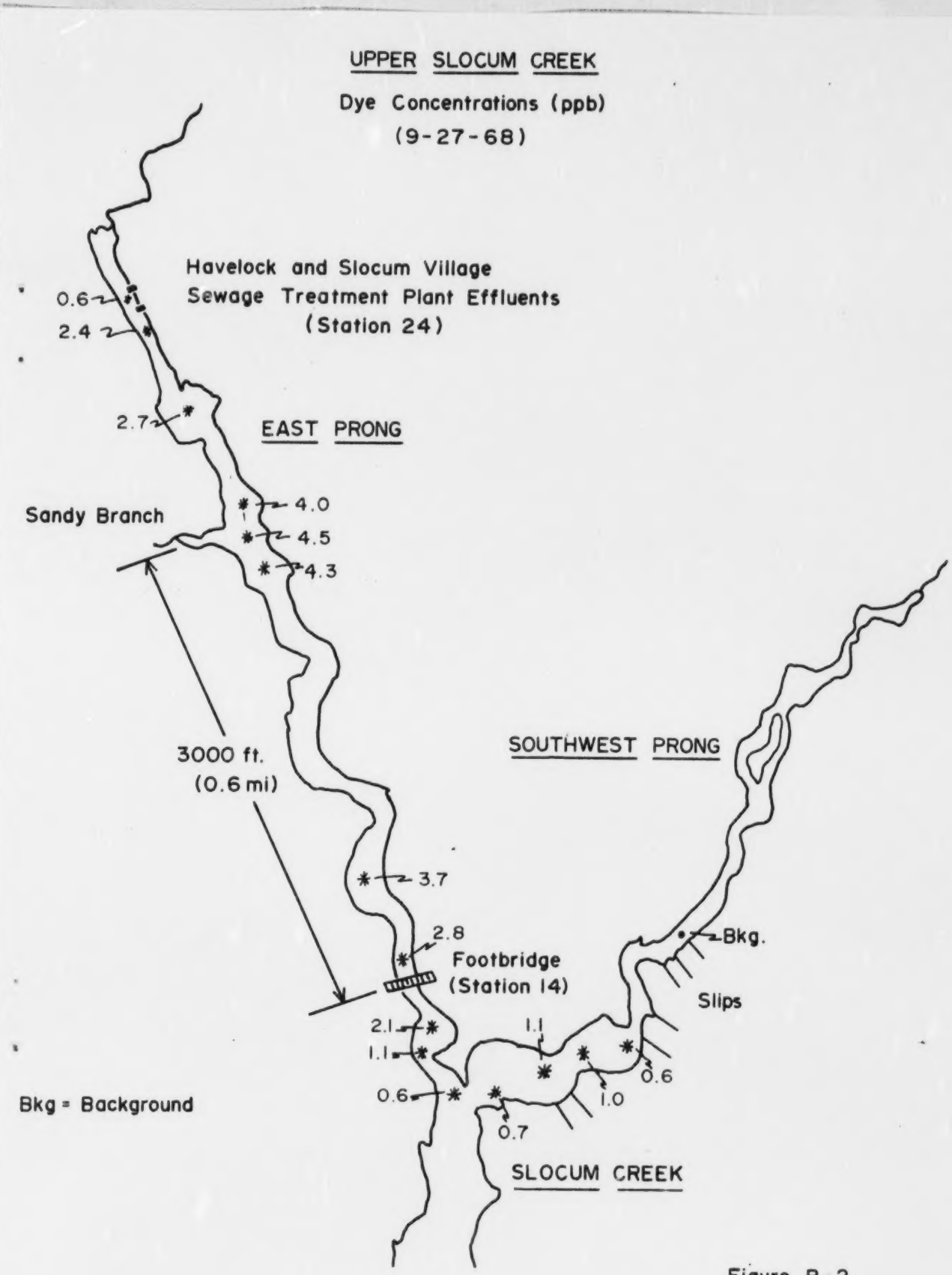
UPPER SLOCUM CREEK
Dye Concentrations (ppb)
(9-27-68)
Havelock and Slocum Village
Sewage Treatment Plant Effluents
(Station 24)
0.6
2.4
2.7
EAST PRONG
Sandy Branch
4.0
4.5
4.3
3000 ft.
(0.6 mi)
SOUTHWEST PRONG
3.7
2.8
Footbridge
(Station 14)
Bkg.
Slips
2.1
1.1
1.1
0.6
0.6
1.0
0.7
SLOCUM CREEK
Bkg = Background

Figure B-2

in Figure B-3. The final data for this dosing were collected on September 29, 1968, around noon and are shown in Figure B-4.

The picture is complicated in that there is uncertainty surrounding the effects of lunar tides and wind on the flow in Slocum Creek. However, certain facts are clear. First, the dye movement out of the prongs was very slow. Apparently several days are required for material to flush from the prongs system. Second, dye had backed up into the Southwest Prong. This shows that material released in the East Prong will get into the Southwest Prong.

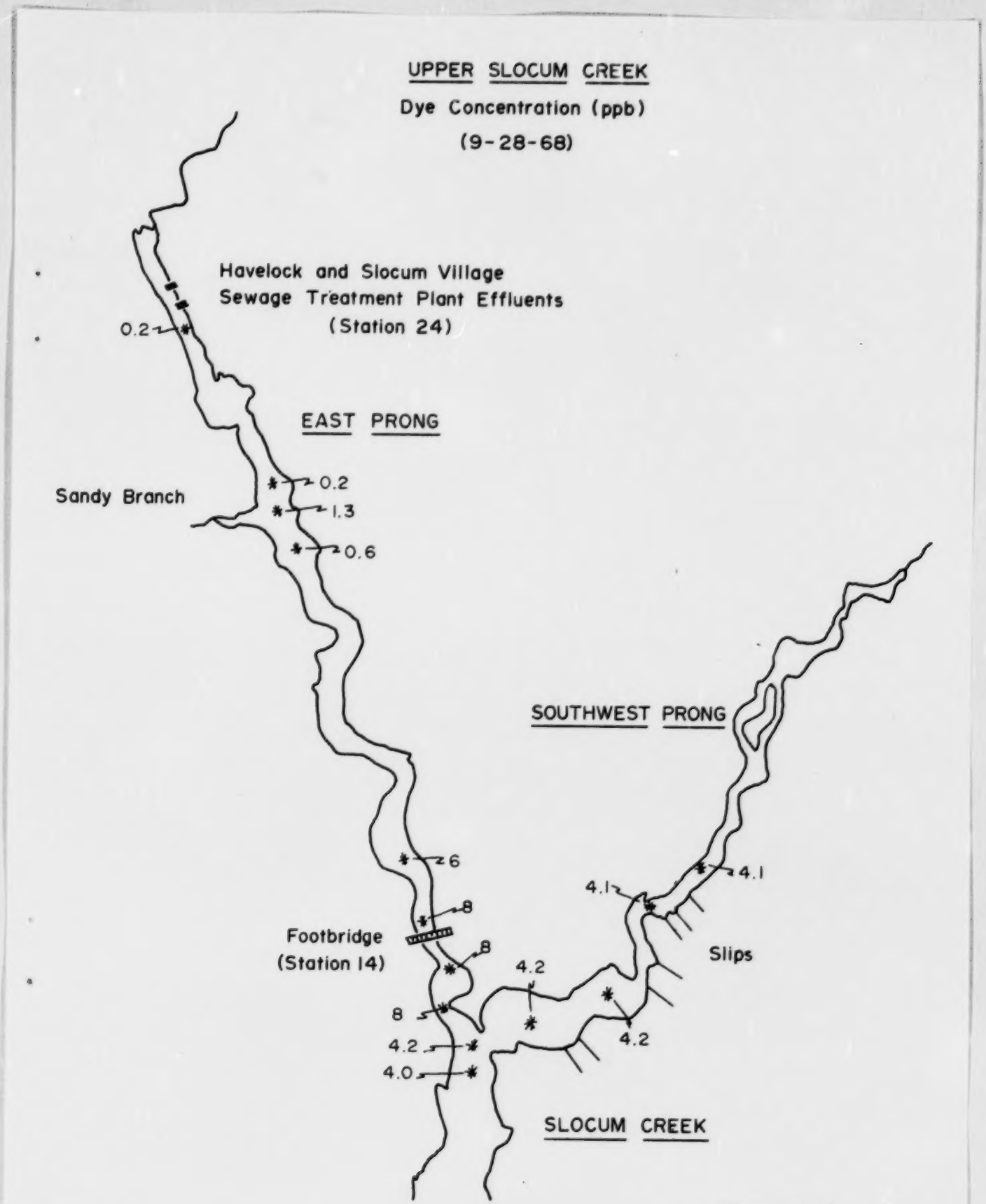
UPPER SLOCUM CREEK
Dye Concentration (ppb)
(9-28-68)
Havelock and Slocum Village
Sewage Treatment Plant Effluents
(Station 24)
0.2
EAST PRONG
Sandy Branch
0.2
1.3
0.6
SOUTHWEST PRONG
6
8
Footbridge
(Station 14)
8
4.1
4.1
Slips
4.2
8
4.2
4.2
4.0
SLOCUM CREEK

Figure B-3

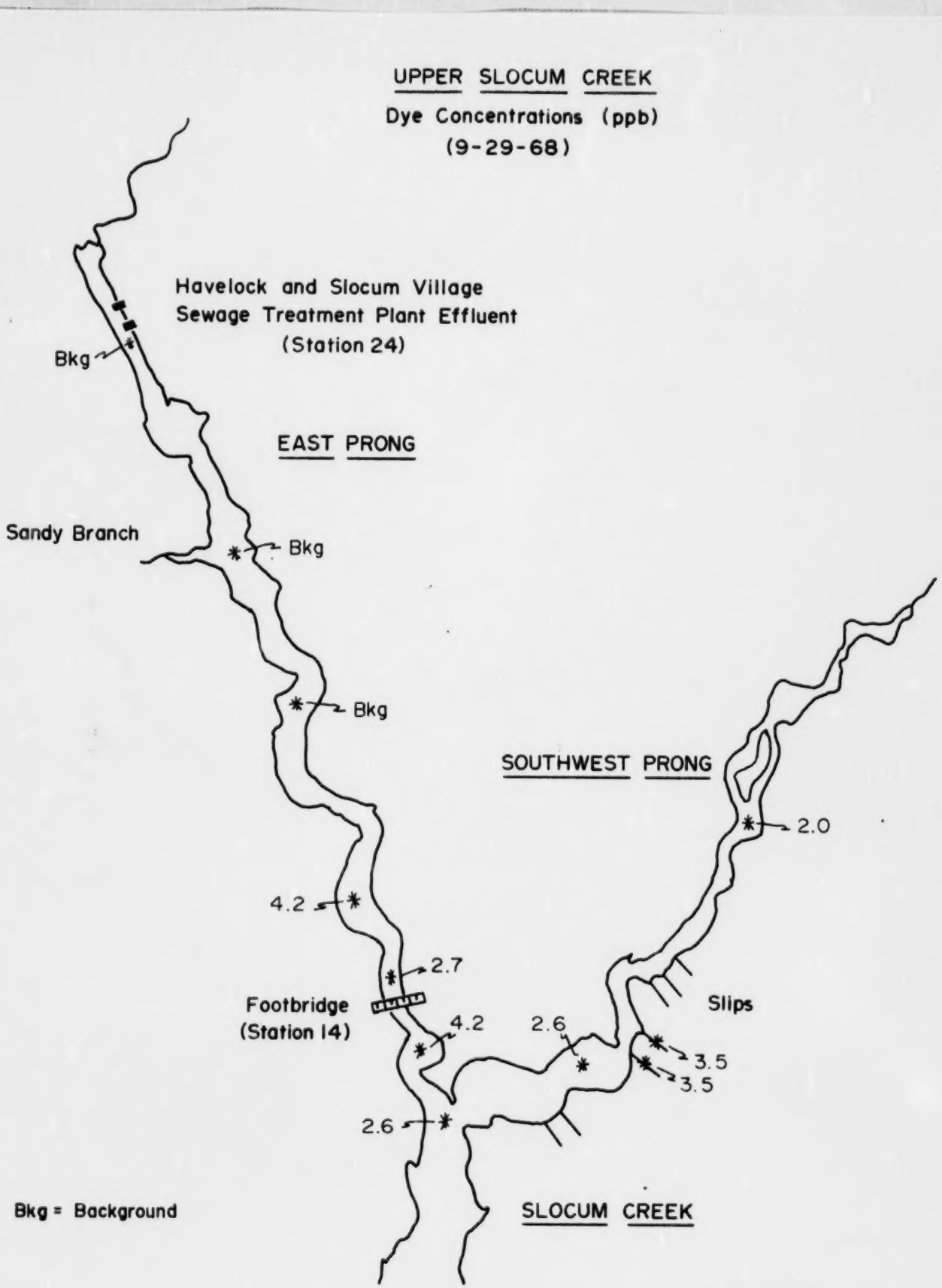
UPPER SLOCUM CREEK
Dye Concentrations (ppb)
(9-29-68)
Havelock and Slocum Village
Sewage Treatment Plant Effluent
(Station 24)
Bkg
EAST PRONG
Sandy Branch
Bkg
Bkg
SOUTHWEST PRONG
2.0
4.2
2.7
Footbridge
(Station 14)
4.2
2.6
Slips
3.5
3.5
2.6
Bkg = Background
SLOCUM CREEK

Figure B-4

DYE STUDY OF THE SEWAGE TREATMENT PLANT EFFLUENT

Two hundred and fifty milliliters of Rhodamine WT dye were discharged into the sewage treatment plant discharge line on September 29, 1968, at 8:18 AM. The dye was put into the discharge line at the point at which the effluent leaves the treatment plant. At 8:45 AM dye was visible in Slocum Creek to about 30 to 40 feet out from the treatment plant outfall. In a 15-minute period there was no observed change in the visible dye pattern. Apparently, after the initial out-rush velocity of the outfall subsided, the dye movement slowed greatly. The visible dye pattern at this time is approximately represented by the crosshatched section marked "V" in Figure B-5.

Between 10:30 AM and 11:00 AM the dye was traced with the Turner fluorometer mounted in the boat. The first trace was made to define the general pattern of distribution in view of following with a more detailed tracing operation. The results of this initial trace are presented in Figure B-5. The values below Ordinance Point, at Slocum Bridge, and several hundred feet upstream from the sewage outfall reflect the dye which was dosed into the East Prong three days earlier. The higher values in the vicinity

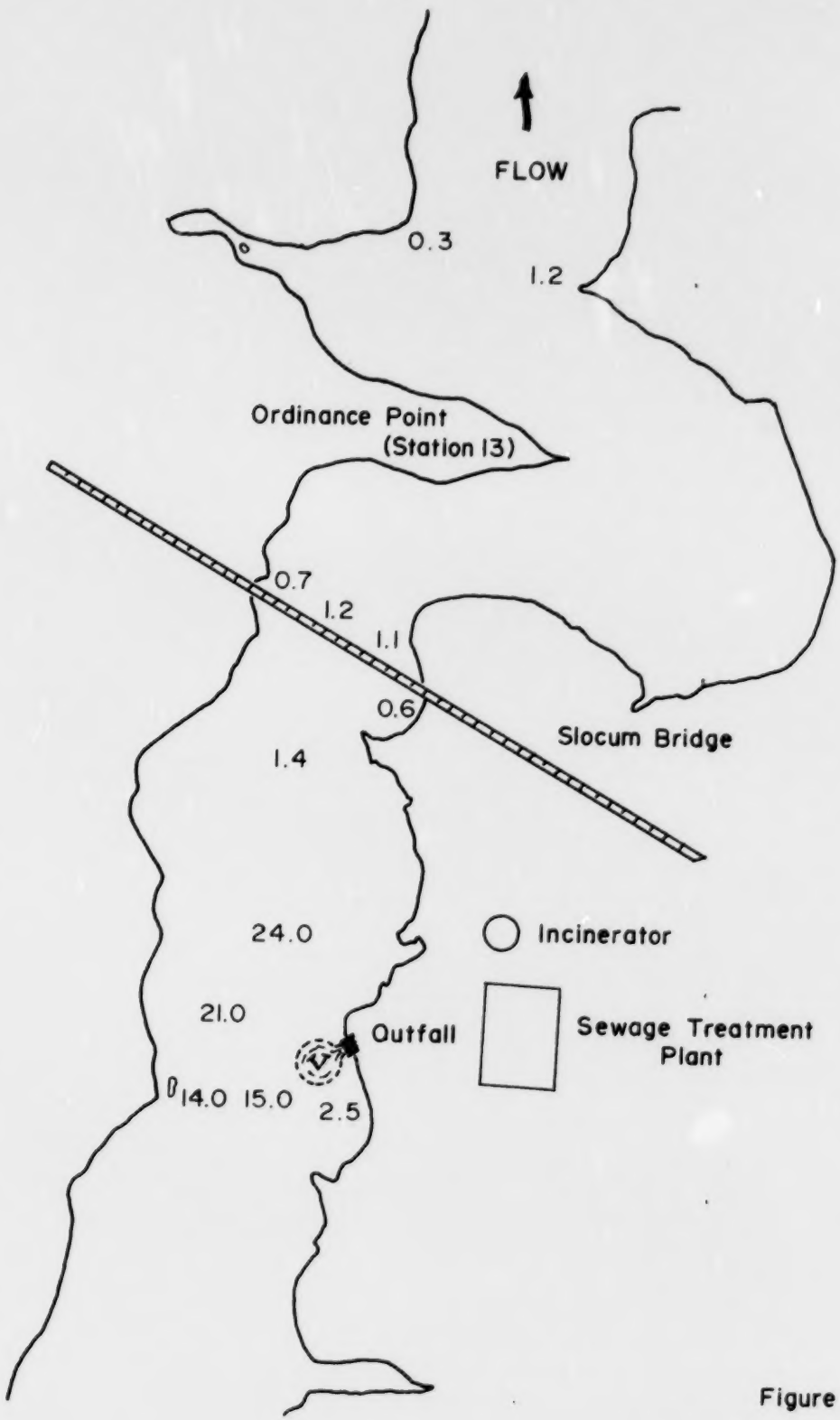
MIDDLE SLOCUM CREEK
Dye Concentrations (ppb)
(9-27-68)
FLOW
0.3
1.2
Ordinance Point
(Station 13)
0.7
1.2
1.1
0.6
Slocum Bridge
1.4
24.0
Incinerator
21.0
Outfall
Sewage Treatment
Plant
14.0
15.0
2.5

Figure B-5

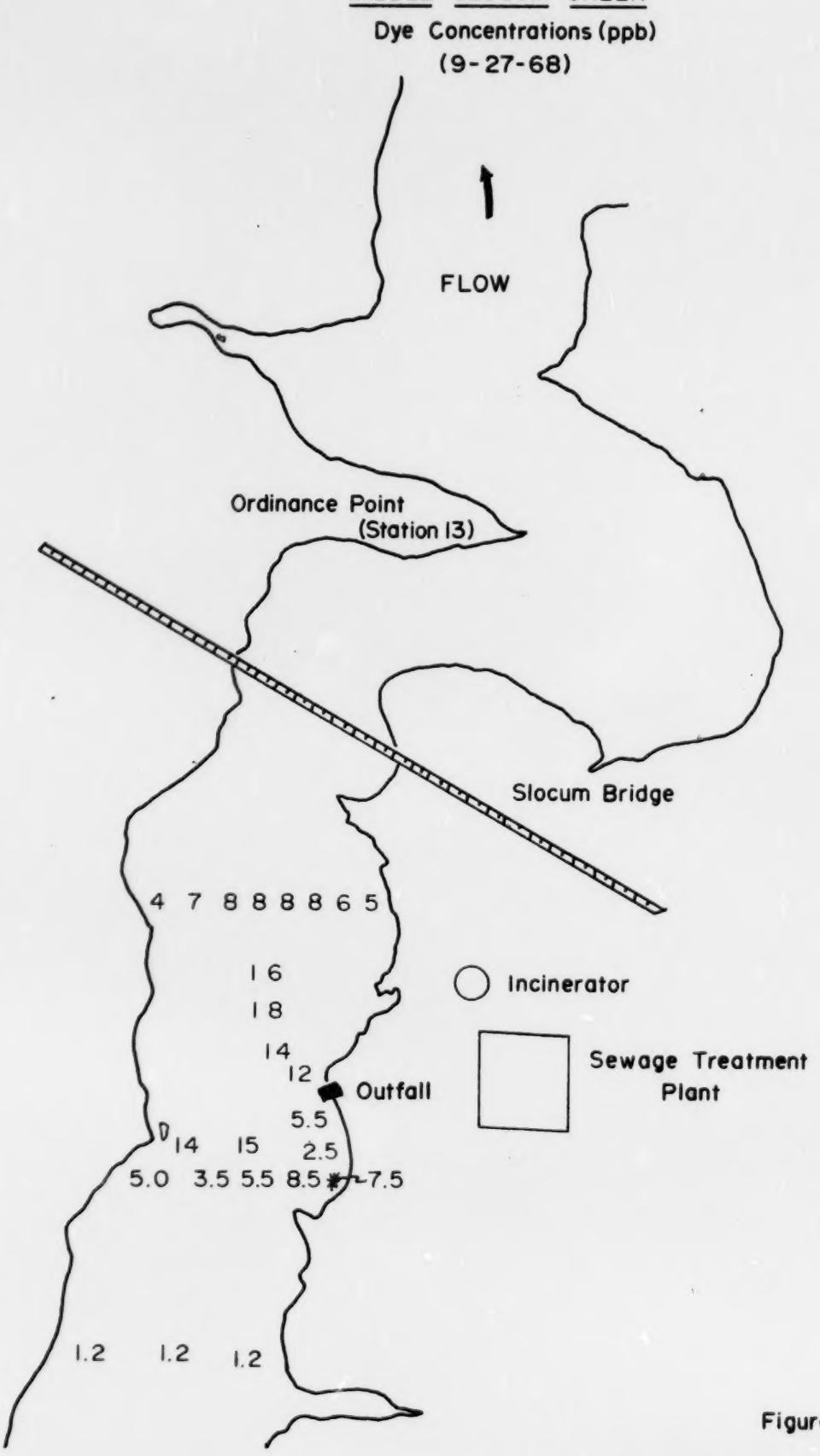
MIDDLE SLOCUM CREEK
Dye Concentrations (ppb)
(9-27-68)
FLOW
Ordinance Point
(Station 13)
Slocum Bridge
4 7 8 8 8 8 6 5
16
18
14
12
Outfall
5.5
14 15 2.5
5.0 3.5 5.5 8.5 7.5
1.2 1.2 1.2
Incinerator
Sewage Treatment
Plant

Figure B-6

of the sewage outfall are due to the dye dosed in the treatment plant effluent. The dye, although spreading out across the channel, was distributed in a spotty fashion making it difficult to define the limits of the pattern.

At 11:00 AM the second leg of the tracing was started and was continued until 11:30 AM, at which time malfunctions of equipment forced termination of the tracing. The results of this second trace are shown in Figure B-6. The dye distribution was still spotty. Thus, the difference in dye concentrations adjacent to the outfall in the two passes may not be significant.

Two significant points are to be noted here. One is that, although the dye movement was predominantly downstream, some dye moved upstream. This could have been due to diffusion, wind effects, tidal changes in velocity, or the persistence of the upstream component of the discharge velocity from the outfall. The second point is that whatever dye movement there was, it was occurring slowly. This is evidenced by the fact that the leading downstream edge of dye moved about 500 feet in three hours or about three quarters of a mile per day.

The following morning, when the equipment was repaired, a third trace was made. These results are presented in Figure B-7. The dye, by this time, had been diluted to nearly background levels. No dye was measurable below Slocum Bridge, and only trace quantities in the vicinity of the sewage outfall.

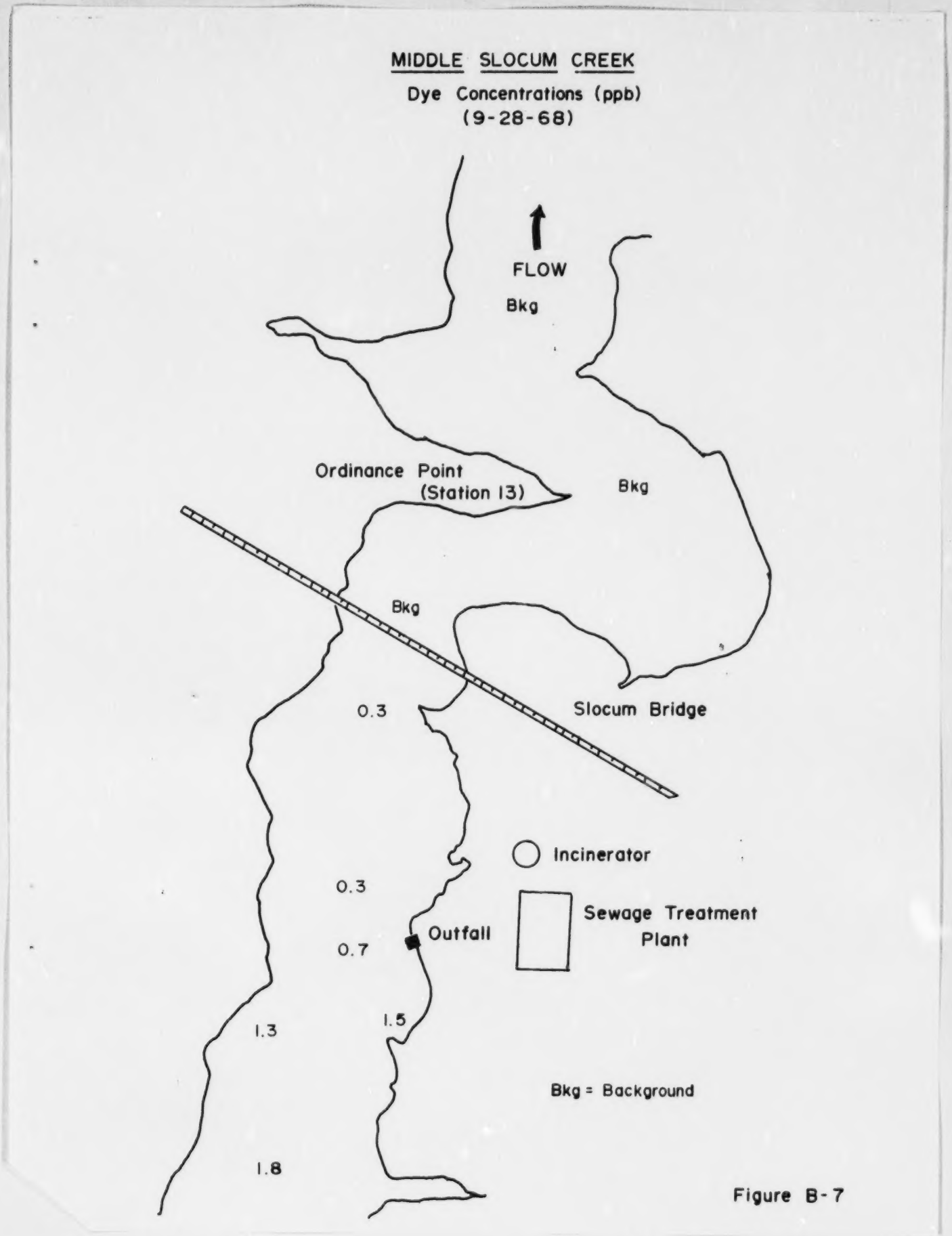
MIDDLE SLOCUM CREEK
Dye Concentrations (ppb)
(9-28-68)
FLOW
Bkg
Ordinance Point
(Station 13)
Bkg
Bkg
0.3
Slocum Bridge
Incinerator
0.3
Sewage Treatment
Plant
Outfall
0.7
1.5
1.3
Bkg = Background
1.8

Figure B-7

TIDAL EFFECTS

Small water level changes in the East Prong similar to tidal changes were observed. In order to measure these changes, staff gauges were installed at three locations. The first was located at the footbridge over the East Prong, the second was placed on Slocum Bridge, and the third was mounted on a marker piling (Marker 10) in mid-channel opposite Tucker Creek. Observations were taken whenever possible; there was no continuous record.

Data collected from these gauges were not adequate to completely define the patterns of water level changes. However, at all three locations levels did change in a manner which suggests some tidal action. The maximum observed changes (maximum observation minus minimum observation) are reported in Table B-1.

Table B-1

Location	Maximum Observed Change (feet)	(inches)
Footbridge	0.26	3.1
Slocum Bridge	0.30	3.6
Marker 10	0.48	5.76

The partial pattern of water level changes appeared to be periodic with a period of about 24 hours. The data are not, however, sufficient to demonstrate this point with confidence. Thus, the water level changes may be due to lunar tides or to wind tide effects or to a combination of both. The observation that the waters of Slocum Creek are saline to some extent would tend to support the fact that there is some lunar tidal effect in Slocum Creek. Since water level changes were observed in the East Prong (footbridge data), and since these changes are in harmony with those at other locations, it is reasonable that, if there are in fact lunar tidal effects in Slocum Creek, these effects extend at least into the lower reaches of the prongs.

OTHER OBSERVATIONS

Of the various observations made during the survey, one of the most striking was that of many schools each containing large numbers of small fish (one to four inches long) in almost all parts of Slocum Creek. These fish were identified by a local fisherman as Menhaden. However, no specimens were taken and thus positive identification is lacking. The fish made their appearance periodically and were observed to swim in the upper few inches of surface water. These fish were seen in all parts of the creek except the upper reach of the East Prong just below the Slocum Village sewage outfall. The water here was usually foul.

Several crabs were seen at the footbridge. Jellyfish were observed in the lower reaches of the creek, one being sighted as far up as Ordinance Point. Several schools of large fish (six to twelve inches in length) were observed just above the Station Sewage Treatment Plant outfall.

A number of dissolved oxygen measurements were made in addition to those made in the stream quality survey. They are reported in Table B-2.

There are several points which should be noted regarding these observations. The dissolved oxygen concentrations in the lower reaches of Slocum

Creek (below Ordinance Point) are reflected by the measurements at Stations 11, 12, and 13. It appears that the water in this area is well aerated from surface to bottom. The prongs, however, are in a more critical condition as evidenced by the observations on October 4, 1968, at Station 14 (footbridge), on October 5, 1968, at Stations 14, 15, the Highway 70 bridge across the Southwest Prong, and the Southwest Prong just below the island. These stations show very low or zero dissolved oxygen at the bottom with surface concentrations varying from low to supersaturation. The upper reaches of the Southwest Prong show oxygen supersaturation at the surface with essentially zero dissolved oxygen at the bottom. Station 14 on the East Prong did not show supersaturation at the surface but did show zero oxygen at the bottom. The areas of surface supersaturation indicate the presence of phytoplankton which probably provides the attraction for the Menhaden.

Table B-2

Date	Time	Location	Depth (feet)	Temp. (°C)	Dissolved Oxygen DO Meter* (ppm)	Dissolved Oxygen Winkler (ppm)
10/4/68	10:30 AM	Station 14	Surface	-	0.2	0.0
			1.5	-	0.2	0.0
			3	-	0.2	0.0
			7	-	0.2	0.0
			15 (Bot.)	-	0.2	0.0
10/5/68	11:45 AM	Station 11	10 (Bot.)	20	7.2	6.7
	12:00 N		3	20	7.7	6.9
10/5/68	12:30 PM	Station 12	4 (Bot.)	21	7.5	6.4
10/5/68	1:05 PM	Station 13	2	21	9.0	8.2
	1:15 PM		5	21	7.3	6.5
10/5/68	1:45 PM	Station 15	7 (Bot.)	22	0.3	0.0
	1:50 PM		3	22	2.9	2.3
	1:55 PM		Surface	23	8.0	7.3
10/5/68	2:20 PM	Hwy.70 Bridge	1.5	23	0.4	0.0
	2:25 PM	Across SW Prong	Surface	21	14.4	13.0
10/5/68	2:45 PM	Below Island	11 (Bot.)	23	0.4	-
	2:45 PM	SW Prong	Surface	23	10.8	-
	2:45 PM		Surface	23	8.3	-
	2:50 PM		3	22	0.4	-
10/5/68	3:20 PM	Station 14	Surface	23	3.8	3.3
			8 (Bot.)	22	0.2	0.0
			1.5	20	1.4	0.65

* Weston and Stack, Model 300, Dissolved Oxygen Analyzer

CONCLUSIONS

The following conclusions can be made from the observed data. These conclusions are valid only for the drought condition which existed during the study.

1. The downstream movement of waste materials is slow, varying from about 0.5 to 1.5 miles per day.

2. Wastes discharged into the East Prong will back up into the Southwest Prong.

3. There are water level changes which appear to be periodic as far upstream as the footbridge across the East Prong. These changes are probably due to tidal effects.

4. The wastes which are discharged from Sandy Branch appear to stratify in a surface layer as they move down the East Prong.

APPENDIX C

Summary of the Geologic and Groundwater Characteristics of the Ground-disposal Site,

U. S. Marine Air Corps Cherry Point, North Carolina

Robert C. Scott, Hydrologist
Physical and Engineering Sciences Section
National Field Investigations Center
Division of Technical Support

1968

At the Marine Corps Station, Cherry Point, North Carolina, an area of several acres adjacent to Slocum Creek has been leveled and is primarily used for solid-waste disposal. Unreclaimable jet fuel, oil and other liquid wastes, such as the unguinous refuse from galley grease traps, are disposed in shallow pits along the perimeter of the cleared area.

The disposal site is underlain by surficial sands and clays of post-Miocene age. According to Le Grand[1] (1960, p. 19) these surface deposits average 40 feet in thickness along the coast. This formation is the shallow aquifer of the region, contains groundwater under water-table conditions, and is separated from the deeper artesian aquifers of Tertiary age by a thick layer of blue-clay (Floyd,[2] Table 1). Because the cleared disposal site is a small area more than 50 percent surrounded by Slocum Creek and its tributaries, the area should be well drained and little groundwater should be found. Pits, 30 feet deep or more, dug to the blue-clay near the center of the area for solid waste disposal were observed to contain no water.

The marine base utilizes only the artesian aquifers for its water supplies. The shallow-water aquifer may be important off the base, but nowhere should it be endangered by the operation of the disposal site.

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[1] LeGrand, H. E., 1960. Geology and Groundwater Resources of Wilmington-New Bern area: North Carolina Dept of Water Resources, Groundwater Bull. No. 1, 80 p.

[2] Floyd, E. D., 1968. Groundwater Resources of Craven County, North Carolina: U.S. Geol. Survey Hydrologic Atlas (open-file report).

Considering not only the impermeability of the clay beds but also the head differential between the artesian aquifers and the water-table aquifer which would tend to cause an upward movement of water, contamination of the base water supplies by their present ground disposal practices would seemingly be impossible.

Since most of the liquid refuse disposed into the shallow pits (5 to 10 feet deep) is oily, it should not be susceptible to much movement by ground water action, either by seepage from precipitation or from inundation by a rising water-table from below. Additionally, the disposed liquids are exposed in the pits for some time before burial, and this permits evaporation of the more volatile liquids. The remaining material is viscous and, after seeping into the pit bottom or becoming incorporated with the earth used to fill and cover the pit, forms a buried hydrophobic mass. However, this buried mass may be permeable enough to permit leaching of water soluble salts over a long period of time.

The greatest hazard with respect to pollution is from the placement of the pits near the edge of the disposal site because it is circumscribed on more than 50 percent of its perimeter by slopes that drain to Slocum Creek. As of October 1968, it was observed that eroding gullies had incised one old disposal pit and were threatening others. The liquid refuse coating or sorbed onto the grains of sand and clay has been transported, under erosion, to Slocum Creek. Here, after sedimentation, it is subject to release or desorption into the surface water.

To prevent erosion of waste pits, the sides of the disposal area should be riprapped with bricks, stone, broken concrete blocks, or, perhaps, other stable solid waste material.

APPENDIX D

Tabulated Data

Stream Quality and Waste Discharges
Slocum Creek, Havelock, North Carolina

APPENDIX D

This appendix contains the tabulated analyses of samples collected for this investigation and the identification of the samples.

D-1 to D-14	Stream Stations	Sept. 24-Oct. 1
D-15 to D-18	Sewage Treatment Plants	Sept. 24-Oct. 1
D-19 to D-28	Industrial Wastes	Sept. 30-Oct 5
D-29 to D-35	Pollution Abatement Plant	Dec. 4-13

Tables D-1 through D-18 and D-29 through D-35 are tabulations of significant figures, thus, 0.00 mg/l is interpreted to be "less than 0.01 mg/l."

The following analyses were performed according to Standard Methods for the Examination of Water and Wastewater, 12th Edition, APHA, Inc., New York, 1965.

BOD (Biochemical Oxygen Demand)
COD (Chemical Oxygen Demand)
Oils
Phenol
Cyanide
Dissolved Oxygen
Chloride
Organic Nitrogen

A Model 303 Perkins-Elmer Atomic Absorption Spectrophotometer was used to analyze for the following metals:

Chromium
Copper
Cadmium
Zinc
Nickel
Lead
Aluminum
Iron

Phosphorus was determined by an automated procedure of the stannous chloride method modified from Standard Methods, 12th Edition, 1965.

TABLE D-1 .

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

STREAM SURVEY - STATION 11 MOUTH OF SLOCUM CREEK

DISCRETE SAMPLES

DATE	TIME	PH	BOD MG/L	COD MG/L	PHENOL MG/L	CN MG/L	TOTAL OIL MG/L	ORGANIC N MG/L	TOTAL P MG/L	CONFIRMED COLIFORM MPN/100 ML	FECAL COLIFORM MPN/100 ML
9 24	1115		6.	17.	0.00	0.00	2.	1.6	0.34	110.	20.
9 25	935	8.4	5.	11.	0.00	0.00	1.	1.6	0.33	130.	20.
9 26	1015	8.4	5.	22.	0.00		0.	1.9	0.40	330.	50.
9 27	835	8.5	7.	26.	0.00		0.	1.5	0.38	490.	20.
9 28	850	7.9	4.	21.	0.00		2.	1.2	0.21	270.	20.
9 29	855	7.6	4.	21.	0.00		1.	1.7	0.32	1300.	20.
9 30	910	7.6	5.	37.	0.00		1.	1.8	0.33		
AVERAGE		8.0	5.	22.	0.00	0.00	1.	1.6	0.33	305.	23.
MAXIMUM		8.5	7.	37.	0.00	0.00	2.	1.9	0.40	1300.	50.
MINIMUM		7.6	4.	11.	0.00	0.00	0.	1.2	0.21	110.	20.
NUMBER		6	7	7	7	2	7	7	7	6	6

DATE	TIME	COPPER MG/L	TOTAL CHROMIUM MG/L	LEAD MG/L	NICKEL MG/L	CADMIUM MG/L	ZINC MG/L
9 24	1115	0.02	0.0		0.0	0.00	0.03
9 25	935	0.00	0.0		0.0	0.00	0.04
9 26	1015	0.00	0.0		0.0	0.00	0.03
9 27	835	0.02	0.0		0.0	0.00	0.05
9 28	850	0.01	0.0		0.0	0.00	0.03
9 29	855	0.04	0.0		0.0	0.00	0.04
9 30	910	0.03	0.0		0.0	0.00	0.03
AVERAGE		0.02	0.0	0.00	0.0	0.00	0.04
MAXIMUM		0.04	0.0		0.0	0.00	0.05
MINIMUM		0.00	0.0		0.0	0.00	0.03
NUMBER		7	7	7	7	7	7

TABLE D-2

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

STREAM SURVEY - STATION 11 MOUTH OF SLOCUM CREEK

DISCRETE SAMPLES

DATE	TIME	DEPTH FT.	D. O. MG/L	CHLORIDES MG/L	TEMPERATURE DEG C
9 24	1115				24.
		3	5.1		
		6	4.1		
9 25	935				22.
		3	6.8		
		6	6.1		
9 26	1015				23.
		3	5.1		
		6	4.9		
9 27	835				22.
		3	6.3	7100.	
		6	5.2	7300.	
9 26	850				22.
		3	5.0	6900.	
		6	5.5	6800.	
9 29	855				22.
		3	5.0	7300.	
		6	4.6	7600.	
9 30	910			7300.	21.
		3	5.3	7400.	
		6	5.2	7400.	

TABLE D-3

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

STREAM SURVEY - STATION 12 TUCKER CREEK, 1200 FEET ABOVE MOUTH

DISCRETE SAMPLES

DATE	TIME	PH	BOD MG/L	COD MG/L	PHENOL MG/L	CN MG/L	TOTAL OIL MG/L	ORGANIC N MG/L	TOTAL P MG/L	CONFIRMED COLIFORM MPN/100 ML	FECAL COLIFORM MPN/100 ML
9	24 1135		9.	19.	0.00	0.01	4.	1.8	0.45	80.	20.
9	25 940	8.2	5.	12.	0.00	0.00	3.	1.4	0.26	170.	20.
9	26 1035	8.3	7.	21.			3.	2.1	0.35	140.	20.
9	27 850	8.1	5.	23.			0.	2.0	0.35	790.	20.
9	28 905	8.2	6.	65.			1.	1.4	0.35		
9	29 925	8.2	4.	28.			3.	1.4	0.43	460.	20.
9	30 925	7.5	4.	25.			2.	1.8	0.43		
AVERAGE		8.0	6.	28.	0.00	0.00	2.	1.6	0.37	221.	20.
MAXIMUM		8.3	9.	65.	0.00	0.01	4.	2.1	0.45	790.	20.
MINIMUM		7.5	4.	12.	0.00	0.00	0.	1.4	0.26	80.	20.
NUMBER		6	7	7	2	2	7	7	7	6	6

DATE	TIME	COPPER MG/L	TOTAL CHROMIUM MG/L	LEAD MG/L	NICKEL MG/L	CADMIUM MG/L	ZINC MG/L
9	24 1135	0.02	0.0		0.0	0.00	0.03
9	25 940	0.03	0.0		0.0	0.00	0.03
9	26 1035	0.00	0.0		0.0	0.00	0.02
9	27 850	0.04	0.0		0.0	0.00	0.04
9	28 905	0.01	0.0		0.0	0.00	0.03
9	29 925	0.01	0.0		0.0	0.00	0.03
9	30 925	0.03	0.0		0.0	0.00	0.03
AVERAGE		0.02	0.0	0.00	0.0	0.00	0.03
MAXIMUM		0.04	0.0		0.0	0.00	0.04
MINIMUM		0.00	0.0		0.0	0.00	0.02
NUMBER		7	7	7	7	7	7

TABLE D-4

STREAM SURVEY - STATION 12 MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968
TUCKER CREEK, 1200 FEET ABOVE MOUTH

DISCRETE SAMPLES

DATE	TIME	DEPTH FT.	D. O. MG/L	CHLORIDES MG/L	TEMPERATURE DEG C
9 24	1135	2	5.8		23.
9 25	940	2	5.5		23.
9 26	1035	2	4.7		23.
9 27	850	2	6.8	6800.	23.
9 28	905	2	5.6	6700.	23.
9 29	925	2	5.7	6500. 6800.	22.
9 30	925	2	4.8	6800. 6800.	22.

TABLE D-5

STREAM SURVEY - STATION 13 MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968 SLOCUM CREEK, ORDINANCE POINT

DISCRETE SAMPLES

DATE	TIME	PH	BOD MG/L	COD MG/L	PHENOL MG/L	CN MG/L	TOTAL OIL MG/L	ORGANIC N MG/L	TOTAL P MG/L	CONFIRMED COLIFORM MPN/100 ML	FECAL COLIFORM MPN/100 ML
9	24 1150		12.	12.	0.00	0.00	5.	2.2	0.85	1720.	230.
9	25 955	8.6	11.	18.	0.00	0.00	3.	2.5	0.71	13000.	110.
9	26 1045	9.0	11.	28.			4.	1.9	0.65	17200.	140.
9	27 905	7.9	11.	25.			0.	2.4	0.66	24000.	460.
9	28 920	8.7	9.	32.			4.	1.8	0.62	10900.	3300.
9	29 945	8.6	10.	35.			2.	1.6	0.86	22100.	1720.
9	30 940	8.3	11.	36.			3.	2.5	0.88		
AVERAGE		8.5	11.	27.	0.00	0.00	3.	2.1	0.75	11425.	458.
MAXIMUM		9.0	12.	36.	0.00	0.00	5.	2.5	0.88	24000.	3300.
MINIMUM		7.9	9.	12.	0.00	0.00	0.	1.6	0.62	1720.	110.
NUMBER		6	7	7	2	2	7	7	7	6	6

DATE	TIME	COPPER MG/L	TOTAL CHROMIUM MG/L	LEAD MG/L	NICKEL MG/L	CADMIUM MG/L	ZINC MG/L
9	24 1150	0.01	0.0		0.0	0.00	0.00
9	25 955	0.01	0.0		0.0	0.00	0.02
9	26 1045	0.00	0.0		0.0	0.00	0.02
9	27 905	0.00	0.0		0.0	0.00	0.03
9	28 920	0.01	0.0		0.0	0.00	0.03
9	29 945	0.01	0.0		0.0	0.00	0.03
9	30 940						
AVERAGE		0.01	0.0	0.00	0.0	0.00	0.02
MAXIMUM		0.01	0.0		0.0	0.00	0.03
MINIMUM		0.00	0.0		0.0	0.00	0.00
NUMBER		6	6	7	6	6	6

TABLE D-6

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

STREAM SURVEY - STATION 13 SLOCUM CREEK, ORDINANCE POINT

DISCRETE SAMPLES

DATE	TIME	DEPTH FT.	D. O. MG/L	CHLORIDES MG/L	TEMPERATURE DEG C
9 24	1150	3	5.1		24.
9 25	955	3	1.3		22.
9 26	1045	3	2.1		24.
9 27	905	3	1.0	6900.	22.
9 28	920	3	0.6	6500.	22.
9 29	945	3	2.8	4700. 6400.	22.
9 30	940	3	3.2	5000. 5900.	22.

TABLE D-7

STREAM SURVEY - STATION 14 MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968
EAST PRONG, FOOT BRIDGE, 900 FEET ABOVE MOUTH

DISCRETE SAMPLES

DATE TIME	PH	BOD MG/L	COD MG/L	PHENOL MG/L	CN MG/L	TOTAL OIL MG/L	ORGANIC N MG/L	TOTAL P MG/L	CONFIRMED COLIFORM MPN/100 ML	FECAL COLIFORM MPN/100 ML
9 24 1205		22.	21.	0.00	0.00	7.	2.3	1.20	130000.	2300.
9 25 1020	8.1	16.	38.	0.00	0.00	3.	2.5	0.88	172000.	33000.
9 26 1110	8.2	29.	42.	0.01	0.00	4.	2.2	0.83	920000.	70000.
9 27 925	7.0	19.	30.	0.00		0.	2.9	0.95	1600000.	542000.
9 28 940	7.5	18.	48.	0.00		6.	2.2	2.50	3480000.	330000.
9 29 1000	7.1	17.	33.	0.00		2.	1.8	2.20	1300000.	330000.
9 30 955	7.4	12.	37.	0.00		1.	1.7	2.40		
AVERAGE	7.5	19.	36.	0.00	0.00	3.	2.2	1.57	728090.	82430.
MAXIMUM	8.2	29.	48.	0.01	0.00	7.	2.9	2.50	3480000.	542000.
MINIMUM	7.0	12.	21.	0.00	0.00	0.	1.7	0.83	130000.	2300.
NUMBER		7	7	7	3	7	7	7	6	6

DATE TIME	COPPER MG/L	TOTAL CHROMIUM MG/L	LEAD MG/L	NICKEL MG/L	CADMIUM MG/L	ZINC MG/L
9 24 1205	0.00	0.0		0.0	0.00	0.05
9 25 1020	0.01	0.0		0.0	0.00	0.02
9 26 1110	0.00	0.0		0.0	0.00	0.03
9 27 925	0.01	0.0		0.0	0.00	0.02
9 28 940	0.01	0.0		0.0	0.00	0.05
9 29 1000	0.00	0.0		0.0	0.00	0.02
9 30 955						
AVERAGE	0.01	0.0	0.00	0.0	0.00	0.03
MAXIMUM	0.01	0.0		0.0	0.00	0.05
MINIMUM	0.00	0.0		0.0	0.00	0.02
NUMBER	6	6	7	6	6	6

TABLE D-8

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

STREAM SURVEY - STATION 14 EAST PRONG, FOOT BRIDGE, 900 FEET ABOVE MOUTH

DISCRETE SAMPLES

DATE	TIME	DEPTH FT.	D. O. MG/L	CHLORIDES MG/L	TEMPERATURE DEG C
9 24	1205	3	2.5		26.
9 25	1020	3	0.6		23.
9 26	1110	3	0.0		23.
9 27	925	3	0.0	4800.	22.
9 28	940	3	0.2	4700.	21.
9 29	1000	3	0.0	950. 4400.	20.
9 30	955	3	0.0	2800. 4400.	22.

TABLE D-9

STREAM SURVEY - STATION 15 MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968
SOUTHWEST PRONG, 900 FEET ABOVE MOUTH

DISCRETE SAMPLES

DATE	TIME	PH	BOD MG/L	COD MG/L	PHENOL MG/L	CN MG/L	TOTAL OIL MG/L	ORGANIC N MG/L	TOTAL P MG/L	CONFIRMED COLIFORM MPN/100 ML	FECAL COLIFORM MPN/100 ML
9	24 1215			16.	0.00	0.00	5.	2.8	0.88	7900.	330.
9	25 1010	7.5	13.	27.	0.00		2.	2.3	0.57	4600.	260.
9	26 1100	7.6	12.	28.	0.00		4.	1.4	0.55	22100.	460.
9	27 920	7.0	8.	21.	0.00		0.	2.0	0.60	13000.	230.
9	28 930	7.4	17.	46.	0.00		4.	2.0	2.30	160000.	92000.
9	29 955	7.3	14.	29.	0.00		1.	1.8	0.71	54200.	3300.
9	30 950	7.9	21.	43.	0.00		3.	2.1	0.67		
AVERAGE		7.4	14.	30.	0.00	0.00	3.	2.0	0.90	21191.	1184.
MAXIMUM		7.9	21.	46.	0.00	0.00	5.	2.8	2.30	160000.	92000.
MINIMUM		7.0	8.	16.	0.00	0.00	0.	1.4	0.55	4600.	230.
NUMBER		6	6	7	7	1	7	7	7	6	6

DATE	TIME	COPPER MG/L	TOTAL CHROMIUM MG/L	LEAD MG/L	NICKEL MG/L	CADMIUM MG/L	ZINC MG/L
9	24 1215	0.00	0.0		0.0	0.00	0.04
9	25 1010	0.01	0.0		0.0	0.00	0.00
9	26 1100	0.01	0.0		0.0	0.00	0.02
9	27 920	0.01	0.0		0.0	0.00	0.02
9	28 930	0.01	0.0		0.0	0.00	0.05
9	29 955	0.01	0.0		0.0	0.00	0.01
9	30 950	0.01	0.0		0.0	0.00	0.01
AVERAGE		0.01	0.0	0.00	0.0	0.00	0.02
MAXIMUM		0.01	0.0		0.0	0.00	0.05
MINIMUM		0.00	0.0		0.0	0.00	0.00
NUMBER		7	7	7	7	7	7

TABLE D-10 .

STREAM SURVEY - STATICN 15 MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968
SOUTHWEST PRONG, 900 FEET ABCVE MOUTH

DISCRETE SAMPLES

DATE	TIME	DEPTH FT.	D. O. MG/L	CHLORIDES MG/L	TEMPERATURE DEG C
9 24	1215	2	7.8		24.
9 25	1010	2	1.5		22.
9 26	1100	2	0.0		23.
9 27	920	2	0.0	4700.	22.
9 28	930	2	0.0	4500.	21.
9 29	955	2	0.0	3000. 4300.	21.
9 30	950	2	0.1	2700. 4400.	21.

TABLE D-11

STREAM SURVEY - STATION 16 MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968 EAST PRONG, HIGHWAY 101

DISCRETE SAMPLES

DATE TIME	PH	BOD MG/L	COD MG/L	PHENOL MG/L	CN MG/L	TOTAL OIL MG/L	ORGANIC N MG/L	TOTAL P MG/L	CONFIRMED COLIFORM MPN/100 ML	FECAL COLIFORM MPN/100 ML
9 24 1415	7.1	6.	12.	0.00	0.00	0.	1.0	0.81	13000.	460.
9 25 1140	7.1	2.	14.	0.00	0.00	4.	1.1	0.17	34800.	940.
9 26 1315	7.3	2.	12.	0.00		0.	0.6	0.18	54200.	1090.
9 27 1050	6.7	3.	14.	0.00		2.	1.0	0.27	54200.	490.
9 28 1100	6.9	3.	27.	0.00		3.	0.8	0.11	160000.	24000.
9 29 1135	7.1		18.	0.00		1.	0.5	0.08	34800.	2300.
9 30 1130	6.7		14.	0.00		5.	0.6	0.14		
AVERAGE	6.9	3.	16.	0.00	0.00	2.	0.7	0.25	44146.	1528.
MAXIMUM	7.3	6.	27.	0.00	0.00	5.	1.1	0.81	160000.	24000.
MINIMUM	6.7	2.	12.	0.00	0.00	0.	0.5	0.08	13000.	460.
NUMBER	7	5	7	7	2	7	7	7	6	6

DATE TIME	COPPER MG/L	TOTAL CHROMIUM MG/L	LEAD MG/L	NICKEL MG/L	CADMIUM MG/L	ZINC MG/L
9 24 1415	0.00	0.0		0.0	0.00	0.04
9 25 1140	0.00	0.0		0.0	0.00	0.00
9 26 1315	0.00	0.0		0.0	0.00	0.00
9 27 1050	0.00	0.0		0.0	0.00	0.01
9 28 1100	0.00	0.0		0.0	0.00	0.03
9 29 1135	0.00	0.0		0.0	0.00	0.02
9 30 1130	0.00	0.0		0.0	0.00	0.02
AVERAGE	0.00	0.0	0.00	0.0	0.00	0.02
MAXIMUM	0.00	0.0		0.0	0.00	0.04
MINIMUM	0.00	0.0		0.0	0.00	0.00
NUMBER	7	7	7	7	7	7

TABLE D-12 .

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

STREAM SURVEY - STATION 16 EAST PRONG, HIGHWAY 101

DISCRETE SAMPLES

DATE	TIME	DEPTH FT.	D. O. MG/L	CHLORIDES MG/L	TEMPERATURE DEG C
9 24	1415	2	0.0		21.
9 25	1140	2	0.0		20.
9 26	1315	2	1.9		20.
9 27	1050	2	0.0	1120. 1120.	19.
9 28	1100	2	2.4	26.	18.
9 29	1135	2	3.0	22. 26.	18.
9 30	1130	2	2.0	36. 110.	17.

TABLE D-13

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

STREAM SURVEY - STATION 17 SOUTHWEST PRONG, LOCAL ROAD WEST OF RAILROAD TRACKS

DISCRETE SAMPLES

DATE	TIME	PH	BOD MG/L	COD MG/L	PHENOL MG/L	CN MG/L	TOTAL OIL MG/L	ORGANIC N MG/L	TOTAL P MG/L	CONFIRMED COLIFORM MPN/100 ML	FECAL COLIFORM MPN/100 ML
9	24 1345	7.0	3.	14.	0.00	0.00	1.	1.0	0.63	1720.	230.
9	25 1115	7.1	1.	9.	0.00		3.	1.1	0.07	790.	130.
9	26 1255	6.9	2.	9.	0.00		0.	0.6	0.11	6300.	
9	27 1030	6.8	1.	11.	0.00		0.	1.0	0.15	7000.	
9	28 1045	6.9	1.	17.	0.00		3.	0.6	0.05	1090.	4600.
9	29 1120	7.0		14.	0.00		1.	0.8	0.03	1750.	330.
9	30 1100	6.7		13.	0.00		5.	0.4	0.07		
AVERAGE		6.9	2.	12.	0.00	0.00	2.	0.7	0.16	2203.	461.
MAXIMUM		7.1	3.	17.	0.00	0.00	5.	1.1	0.63	7000.	4600.
MINIMUM		6.7	1.	9.	0.00	0.00	0.	0.4	0.03	790.	130.
NUMBER		7	5	7	7	1	7	7	7	6	4

DATE	TIME	COPPER MG/L	TOTAL CHROMIUM MG/L	LEAD MG/L	NICKEL MG/L	CADM MG/L	MG/L
9	24 1345	0.00	0.0		0.0	0.00	0.03
9	25 1115	0.00	0.0		0.0	0.00	0.00
9	26 1255	0.00	0.0		0.0	0.00	0.00
9	27 1030	0.00	0.0		0.0	0.00	0.03
9	28 1045	0.00	0.0		0.0	0.00	0.00
9	29 1120	0.00	0.0		0.0	0.00	0.00
9	30 1100						
AVERAGE		0.00	0.0	0.00	0.0	0.00	0.01
MAXIMUM		0.00	0.0		0.0	0.00	0.03
MINIMUM		0.00	0.0		0.0	0.00	0.00
NUMBER		6	6	7	6	6	6

TABLE D-14

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

STREAM SURVEY - STATION 17 SOUTHWEST PRONG, LOCAL ROAD WEST OF RAILROAD TRACKS

DISCRETE SAMPLES

DATE	TIME	DEPTH FT.	D. O. MG/L	CHLORICES MG/L	TEMPERATURE DEG C
9 24	1345	1	0.0		19.
9 25	1115	1	0.0		19.
9 26	1255	1	1.4		20.
9 27	1030	1	0.8	450.	18.
9 26	1045	1	4.8	51.	17.
9 29	1120	1	4.1	19. 36.	17.
9 30	1100	1	4.0	22. 52.	16.

TABLE D-15

MARINE AIR CORPS STATION, CHERRY POINT, .C. - 1968

STREAM SURVEY - STATION 18 SLOCUM VILLAGE SEWAGE TREATMENT PLANT EFFLUENT AT EAST PRONG

DISCRETE SAMPLES

DATE TIME	CONFIRMED COLIFORM MPN/100 ML	FECAL COLIFORM MPN/100 ML	CHLORINE RESIDUAL MG/L
9 24 1400	1600000.	1600000.	0.0
9 25 1030	160000000.	54200000.	
9 26 1115	46000000.	10900000.	0.0
9 27 930	130000000.	70000000.	0.2
9 28 945	79000000.	17200000.	0.0
9 29 1010	109000000.	4600000.	0.0
9 30 1010			0.0
MEAN/AVERAGE	48610000.	8980000.	0.0
MAXIMUM	160000000.	54200000.	0.2
MINIMUM	1600000.	1600000.	0.0
NUMBER	6	6	6

STREAM SURVEY - STATION 19 STATION SEWAGE TREATMENT PLANT CHLORINATED EFFLUENT

DISCRETE SAMPLES

DATE TIME	CONFIRMED COLIFORM MPN/100 ML	FECAL COLIFORM MPN/100 ML	CHLORINE RESIDUAL MG/L
9 24 1445	3300.	330.	0.5
9 25 1055	13000.	170.	1.5
9 26 1245	1720.	330.	1.0
9 27 1010	160000.	160000.	0.0
9 28 1030	230.	50.	2.5
9 29 1105	3300.	330.	2.0
9 30 1050			1.0
MEAN/AVERAGE	4557.	604.	1.2
MAXIMUM	160000.	160000.	2.5
MINIMUM	230.	50.	0.0
NUMBER	6	6	7

TABLE D-16

MARINE AIR CORPS STATION, CHERRY POINT, N.C - 1968

STREAM SURVEY - STATION 21 STATION SEWAGE TREATMENT PLANT INFLUENT

24-HR. COMPOSITE SAMPLES

DATE	TIME	FLOW MGD	PH	BOD MG/L	BOD LB/DAY	COD MG/L	TSS MG/L	TSS LB/DAY	ORGANIC N MG/L	TOTAL P MG/L	TOTAL OIL MG/L	TOTAL OIL LB/DAY	CN MG/L
9 25	800	2.02	7.2	300.	5044.	70.	55.	924.	9.5	20.8	39.	655.	0.00
9 26	800	2.00		130.	2170.	220.	52.	868.	15.0	19.5	5.	93.	0.00
9 27	800	2.10		170.	2980.	200.	140.	2454.	7.1	20.5	26.	455.	0.00
9 28	800	1.97	7.4	140.	2303.	190.	130.	2138.	6.4	18.0	6.	106.	0.00
9 29	800	1.76	7.5	160.	2344.	150.	100.	1465.	20.0	20.0	18.	263.	0.00
9 30	800	1.74	7.4	160.	2325.	180.	160.	2325.	6.7	18.2	24.	348.	0.02
10 1	800	2.49	7.2	210.	4363.	190.	80.	1662.	9.3	22.5	32.	664.	0.00
AVERAGE		1.87	7.3	180.	3000.	170.	100.	1600.	10.5	19.9	22.	370.	0.00
MAXIMUM		2.49	7.5	300.	5044.	220.	160.	2454.	20.0	22.5	39.	664.	0.02
MINIMUM		1.74	7.2	130.	2170.	70.	52.	868.	6.4	18.0	5.	93.	0.00
NUMBER		7	5	7	7	7	7	7	7	7	7	7	7

STREAM SURVEY - STATION 22 STATION SEWAGE TREATMENT PLANT EFFLUENT

24-HR. COMPOSITE SAMPLES

DATE	TIME	FLOW MGD	PH	BOD MG/L	BOD LB/DAY	COD MG/L	TSS MG/L	TSS LB/DAY	ORGANIC N MG/L	TOTAL P MG/L
9 25	800	2.02	7.2	86.	1446.	64.	18.	302.	7.1	18.8
9 26	800	2.00		42.	701.	71.	22.	367.	8.1	21.0
9 27	800	2.10		43.	753.	80.	36.	631.	5.6	17.5
9 28	800	1.97	7.6	37.	608.	110.	39.	641.	5.0	17.2
9 29	800	1.76	7.6			100.	29.	424.	14.0	16.2
9 30	800	1.74	7.6	42.	610.	100.	58.	842.	6.8	17.3
10 1	800	2.49	7.6	54.	1121.	110.	24.	498.	6.2	20.5
AVERAGE		1.87	7.5	51.	870.	91.	32.	530.	7.5	18.3
MAXIMUM		2.49	7.6	86.	1446.	110.	58.	842.	14.0	21.0
MINIMUM		1.74	7.2	37.	608.	64.	18.	302.	5.0	16.2
NUMBER		7	5	6	6	7	7	7	7	7

TABLE D-17 .

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

STREAM SURVEY - STATION 23

SLOCUM VILLAGE SEWAGE TREATMENT PLANT INFLUENT

24-HR. COMPOSITE SAMPLES

DATE	TIME	FLOW MGD	PH	BOD MG/L	BOD LB/DAY	COD MG/L	TSS MG/L	TSS LB/DAY	ORGANIC N MG/L	TOTAL P MG/L
9 25	800	0.22	8.0	280.	504.		50.	90.		
9 26	800	0.21		240.	423.	280.	88.	155.	7.8	28.0
9 27	800	0.22		160.	292.	190.	140.	255.	6.8	26.5
9 28	800	0.23	7.2	180.	348.	150.	210.	406.	6.1	26.5
9 29	800	0.21	8.0	160.	286.	220.	120.	214.	20.0	29.0
9 30	800	0.21	7.6	160.	284.	200.	180.	319.	6.6	23.5
10 1	800	0.23	7.8	200.	391.	300.	180.	352.	7.7	27.0
AVERAGE		0.22	7.7	190.	360.	220.	130.	250.	9.1	26.7
MAXIMUM		0.23	8.0	280.	504.	300.	210.	406.	20.0	29.0
MINIMUM		0.21	7.2	160.	284.	150.	50.	90.	6.1	23.5
NUMBER		7	5	7	7	6	7	7	6	6

STREAM SURVEY - STATION 24

SLOCUM VILLAGE SEWAGE TREATMENT PLANT EFFLUENT

24-HR. COMPOSITE SAMPLES

DATE	TIME	FLOW MGD	PH	BOD MG/L	BOD LB/DAY	COD MG/L	TSS MG/L	TSS LB/DAY	ORGANIC N MG/L	TOTAL P MG/L
9 25	800	0.22	8.0	80.	144.		80.	144.		
9 26	800	0.21		92.	162.	130.	44.	77.	4.5	21.5
9 27	800	0.22		78.	142.	130.	87.	158.	4.8	20.5
9 28	800	0.23	7.7	54.	104.	82.	100.	193.	7.2	20.0
9 29	800	0.21	7.9	28.	50.	110.	87.	155.	12.0	21.5
9 30	800	0.21	7.7	61.	108.	92.	170.	302.	6.4	21.5
10 1	800	0.23	8.3	68.	133.	86.	140.	274.	6.7	23.0
AVERAGE		0.22	7.9	66.	120.	100.	100.	180.	6.9	21.3
MAXIMUM		0.23	8.3	92.	162.	130.	170.	302.	12.0	23.0
MINIMUM		0.21	7.7	28.	50.	82.	44.	77.	4.5	20.0
NUMBER		7	5	7	7	6	7	7	6	6

TABLE D-18

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

STREAM SURVEY - STATION 22 STATION SEWAGE TREATMENT PLANT EFFLUENT

24-HR. COMPOSITE SAMPLES

PERCENT REDUCTIONS

DATE	BOD	TSS	ORGANIC N	TOTAL P
9 25	71.33	67.27	25.26	9.61
9 26	67.69	57.69	46.00	-7.69
9 27	74.70	74.28	21.12	14.63
9 28	73.57	70.00	21.87	4.44
9 29		71.00	30.00	19.00
9 30	73.75	63.75	-1.49	4.94
10 1	74.28	70.00	33.33	8.88
AVERAGE	72.55	67.71	25.15	7.69

STREAM SURVEY - STATION 24 SLOCUM VILLAGE SEWAGE TREATMENT PLANT EFFLUENT

24-HR. COMPOSITE SAMPLES

PERCENT REDUCTIONS

DATE	BOD	TSS	ORGANIC N	TOTAL P
9 25	71.42	-60.00		
9 26	61.66	50.00	42.30	23.21
9 27	51.25	37.85	29.41	22.64
9 28	70.00	52.38	-18.03	24.52
9 29	82.50	27.50	40.00	25.86
9 30	61.87	5.55	3.03	8.51
10 1	66.00	22.22	12.98	14.81
AVERAGE	66.38	19.35	18.28	19.92

Table D-19.
MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

Industrial Waste - Station 26							Naval Air Rework Facility, Storm Sewer at Roosevelt Road
Date	9/26	9/27	9/28	9/29	9/30	10/1	10/2
Time	830	830	830	930	820	800	800
Period (Hr.)	15.5	24.0	24.0	25.0	22.9	23.7	24.0
Flow (1000 gal.)	65	65	65	65	65	65	65
pH	8.6	7.9		8.0	7.4	7.9	7.5
COD mg/l		150	52	32	140	50	76
pounds		81	28	17	75	27	41
Phenol mg/l				< 0.01	< 0.01		54
pounds				< 0.01	< 0.01		29
Total Oil mg/l				9			
pounds				5			
Organic N mg/l				1.3	0.7		
pounds				< 1	< 1		
Total P mg/l				0.09	0.16		
pounds				< 0.1	< 0.1		
Copper mg/l				< 0.01	0.01		0.01
pounds				< 0.1	< 0.1		< 0.1
Total Chromium mg/l				< 0.1	< 0.1		< 0.1
pounds				< 1	< 1		< 1
Lead mg/l				< 0.01	*	*	*
pounds				< 0.1			
Nickel mg/l				< 0.1	< 0.1		
pounds				< 1	< 1		
Cadmium mg/l				< 0.1	< 0.1		
pounds				< 0.1	< 0.1		
Zinc mg/l				0.03	0.03		
pounds				< 0.1	< 0.1		

* Average of 3 samples for lead = < 0.01 mg/l

Table D-20
MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

Industrial Waste - Station 25

Naval Air Rework Facility, Pollution Abatement Sewer Total Discharge

Date	9/26	9/27	9/28	9/29	9/30	10/1	10/2	10/3	10/3	10/5	10/5
Time	815	805	815	845	815	745	745	830	800	840	1600
Period (Hr.)	Grab	Grab	24.2	24.5	23.5	23.5	24.1	24.7	23.7	24.7	7.3
Flow (1000 gal.)			161	154	167	202		136	165	190	34.
pH	7.8	7.4		7.8	7.9		7.8	7.7		7.6	
COD mg/l		250	320	60	20	290		970		190	
pounds			430	77	27	480		1100		300	
Phenol mg/l		48	67	77	5	54	39	51	42	67	
pounds			90	22	8	90		58	57	110	
Cyanides mg/l	< 0.01	3.4	< 0.1	< 0.1	< 0.1	0.01	< 0.01	0.03	0.01	0.01	
pounds			< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	
Total Oil mg/l										17	
pounds										26	
Organic N mg/l			2.4							1.2	
pounds										1	
Total P mg/l			4.4								
pounds											
Copper mg/l			0.10			0.07				0.02	
pounds						0.1				< 0.1	
Total Chromium mg/l			1.4			5.2				1.3	
pounds						8				2	
Lead mg/l			Average of 3 samples for lead = 0.12 mg/l								
pounds											
Nickel mg/l			0.1			< 0.1				< 0.1	
pounds						< 1				< 1	
Cadmium mg/l			0.15			0.26				< 0.01	
pounds						0.4				< 0.1	
Zinc mg/l			0.30			0.18				0.17	
pounds						0.3				0.2	

Table D-21.

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

Discrete Samples

Station 10053			Station 10054		
Date	Time	Total Oil mg/l	Date	Time	Total Oil mg/l
10-1	1315	85.	10-1	1240	42.
10-2	1103	9.	10-2	1400	47.
10-2	1402	9.	10-3	830	239.
10-3	1422	120.	10-3	1400	140.
10-3	1600	120.	10-3	1530	240.
10-4	830	4.	10-4	815	280.
			10-4	1220	30.
Average		58.	Average		140.
Maximum		120.	Maximum		280.
Minimum		4.	Minimum		30.
Number		6	Number		7

Table D-22.
MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

Industrial Waste - Station 13301 — Naval Air Rework Facility, Power Plant Division, Pollution Abatement Sewer

Date	9/27	9/28	9/29	9/30	10/1	10/2	10/2	10/3	10/4	10/5
Time	815	1600	840	855	845	845	1540	1630	1525	1555
Period (Hr.)	17.2	7.5	16.7	24.3	23.7	24.0	6.9	7.9	2.5	7.5
Flow (1000 gal.)		22	51	107	98	131	20	65	34	
pH			7.4	7.6	7.2	6.7		8.1		
COD mg/l	73	92	22	26	75	280	210	270	270	
pounds		17	9	24	61	300	36	150	77	
Phenol mg/l					2.70	1.00	4.70	4.40	3.4	
pounds					2.2	1.0	0.8	2.3	0.9	
Cyanides mg/l					< 0.01	0.01	< 0.01	0.09	0.06	
pounds					< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Organic N mg/l					13.6	9.9	3.2	4.4	6.8	
pounds					11	10	< 1	2	1	
Total P mg/l					5.00	11.00	2.50	11.50	19.20	
pounds					4.0	12.0	0.4	6.2	5.5	
Copper mg/l	0.20	0.01	< 0.01	0.01	0.09	0.40	0.30	0.20	0.09	0.10
pounds		< 0.1	< 0.1	< 0.1	< 0.1	0.4	< 0.1	0.1	< 0.1	
Total Chromium mg/l	0.8	< 0.1	< 0.1	3.4	4.2	32.0	54.0	13.0	3.2	1.8
pounds		< 1	< 1	3	3	34	9	7	< 1	
Lead mg/l	0.2	0.10	< 0.01	< 0.01	0.18	0.92	0.24	0.18	0.21	1.20
pounds		< 0.1	< 0.1	< 0.1	0.1	1.0	< 0.1	< 0.1	< 0.1	
Nickel mg/l	0.2	< 0.1	< 0.1	< 0.1	< 0.1	0.4	0.3	0.3	0.2	< 0.1
pounds		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	
Cadmium mg/l	0.20	< 0.01	< 0.01	< 0.01	0.22	0.74	0.25	0.19	0.23	< 0.01
pounds		< 0.1	< 0.1	< 0.1	0.1	0.8	< 0.1	0.1	< 0.1	
Zinc mg/l	1.10	0.18	< 0.01	0.19	0.18	0.60	0.48	0.22	0.16	1.00
pounds		< 0.1	< 0.1	0.1	0.1	0.6	< 0.1	0.1	< 0.1	

Table D-22. (Cont.)

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

Industrial Waste - Station 13301

Naval Air Reqork Facility, Power Plant Division, Pollution Abatement Sewer

Date	10/1	10/2	10/3	10/3	10/3	10/4	Average
Time	1400	1008	1110	1310	1455	1152	
Period (Hr.)	grab	grab	grab	grab	grab	grab	
Total Oil mg/l	61	21	40	260	13	2740	520
Organic N mg/l					13.6		13.6

Table D-23.
MARINE AIR CORPS STATION, CHERRY POINT, N. C. - 1968

Industrial Waste - Station 13303

NARF, Power Plant, Div., P.A. Sewer Plate and Paint plus Engine Preclean Shops

Date	9/30	10/1	10/2	10/2	10/3	10/4	10/5
Time	1515	1610	957	1511	1615	1540	1545
Period (Hr.)	6.0	7.0	grab	5.8	7.3	6.5	7.0
Flow (1000 gal.)	33	33		33	33	33	33
pH	7.5	7.2			7.7	7.7	7.7
COD mg/l	220	940		1100	190	420	1850
pounds	60	260		302	52	120	510
Phenol mg/l	2.60	1.30		4.30	2.30	0.13	0.09
pounds	0.7	0.3		1.1	0.6	< 0.1	< 0.1
Cyanides mg/l	0.40			0.06	0.17	0.14	0.08
pounds	0.1			< 0.1	< 0.1	< 0.1	< 0.1
Total Oil mg/l	142		143			4100	120
pounds	39					1130	33
Organic N mg/l	1.3	0.9		1.3	1.4	2.0	0.8
pounds	< 1	< 1		< 1	< 1	< 1	< 1
Total P mg/l	23.5	11.7		19.8	36.0	18.2	10.4
pounds	6.4	3.2		5.4	9.9	5.0	2.8
Copper mg/l	0.10	0.10		0.30	0.30	0.09	0.01
pounds	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1
Total Chromium mg/l	22.0	7.8		84.0	15.0	27.0	1.9
pounds	6	2		23	4	7	< 1
Lead mg/l	0.17	0.12		0.25	0.18	0.24	0.22
pounds	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1
Nickel mg/l	< 0.1	0.3		0.5	0.4	0.3	0.4
pounds	< 1	< 1		< 1	< 1	< 1	< 1
Cadmium mg/l	0.74	0.43		0.38	0.34	0.29	0.19
pounds	0.2	0.1		0.1	< 0.1	< 0.1	< 0.1
Zinc mg/l	0.31	0.24		0.50	0.62	0.24	0.13
pounds	< 0.1	< 0.1		0.1	0.1	< 0.1	< 0.1

Table D-24.
MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

Industrial Wastes - Station 13304

Naval Air Rework Facility, Power Plant Division, Plate and Paint Shop

Date	9/30	10/1	10/2	10/2	10/3	10/4	10/5
Time	1520	1515	953	1515	1610	1545	1550
Period (Hr.)	6.0	6.0	grab	5.8	7.1	6.5	6.9
Flow (1000 gal.)	30	30		30	30	30	30
pH	7.2	6.5			6.7	7.0	6.9
COD mg/l	17	12		120	19	22	1540
pounds	4	3		30	4	5	380
Phenol mg/l	0.04	0.02		0.02	< 0.01	< 0.01	
pounds	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	
Cyanides mg/l	0.44	0.16		0.13	0.12	0.16	0.21
pounds	0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1
Total Oil mg/l			1		5	2	2
pounds					1	< 1	< 1
Organic N mg/l	1.0	0.6		0.3	0.9	0.7	0.5
pounds	< 1	< 1		< 1	< 1	< 1	< 1
Total P mg/l	0.11	0.15		0.09	53.0	0.36	0.18
pounds	< 0.1	< 0.1		< 0.1	13.2	< 0.1	< 0.1
Copper mg/l	0.30	0.30		0.30	8.80	0.08	0.02
pounds	< 0.1	< 0.1		< 0.1	2.2	< 0.1	< 0.1
Total Chromium mg/l	33.0	40.0		59.0	12.0	5.2	1.8
pounds	8	10		14	3	1	< 1
Lead mg/l	0.16	0.23		0.08	0.17	0.06	< 0.01
pounds	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1
Nickel mg/l	0.1	0.3		< 0.1	0.3	0.4	0.4
pounds	< 1	< 1		< 1	< 1	< 1	< 1
Cadmium mg/l	1.50	0.74		0.09	0.28	0.53	0.29
pounds	0.3	0.1		< 0.1	< 0.1	0.1	< 0.1
Zinc mg/l	5.60	0.31		0.37	9.2	0.11	0.08
pounds	1.4	< 0.1		< 0.1	2.3	< 0.1	< 0.1

Table D-25.
MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

Industrial Waste - Station 16611							NARF, Air Frame Division, Pollution Abatement Sewer Lift Station				
Date	9/28	9/29	9/30	10/1	10/1	10/1	10/1	10/2	10/2	10/2	10/3
Time	1700	900	2120	850	1355	1443	2125	900	1025	2100	845
Period (Hr.)	8.5	16.0	9.6	11.5	5.1	grab	7.5	11.5	grab	12.0	11.5
Flow (1000 gal.)	22	56	34	22	24		32	24		41	20
pH	9.4	7.3	7.3	7.5	7.6			8.1		7.3	7.4
COD mg/l	54		2360	1120	340		170	1100		1780	360
pounds	10		690	210	69		46	220		610	60
Phenol mg/l			870	240	870		1.0	49.6		2.3	2.3
pounds			250	45	180		0.2	9.9		0.7	0.3
Cyanides mg/l			< 0.01	0.01	< 0.01			0.06		0.03	0.01
pounds			< 0.1	< 0.1	< 0.1			< 0.1		< 0.1	< 0.1
Total Oil mg/l						12			15		
pounds											
Organic N mg/l			1.6	0.7	0.5		0.7	1.8		2.5	1.0
pounds			< 1	< 1	< 1		< 1	< 1		< 1	< 1
Total P mg/l			16.7	5.8	1.2		11.0	9.0		9.5	2.3
pounds			4.8	1.0	0.2		3.0	1.8		3.2	0.3
Copper mg/l	0.10	0.20	0.08	0.05	0.10		4.10	0.20		0.10	0.10
pounds	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		1.1	< 0.1		< 0.1	< 0.1
Total Chromium mg/l	1.0	1.8	2.3	2.8	1.8		3.1	1.8		3.8	3.4
pounds	< 1	< 1	< 1	< 1	< 1		< 1	< 1		1	< 1
Lead mg/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	0.09		0.20	< 0.01
pounds	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1		< 0.1	< 0.1
Nickel mg/l	< 0.1	< 0.1		< 0.1	< 0.1		< 0.1	< 0.1		< 0.1	< 0.1
pounds	< 1	< 1		< 1	< 1		< 1	< 1		< 1	< 1
Cadmium mg/l	0.08	< 0.01	0.11	0.17	0.09		0.16	0.13		0.12	0.12
pounds	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.1		< 0.1	< 0.1
Zinc mg/l	0.18	0.19	1.00	0.30	0.24		0.26	0.23		0.34	0.22
pounds	< 0.1	< 0.1	0.2	< 0.1	< 0.1		< 0.1	< 0.1		0.1	< 0.1

Table D-25 (Cont.)
MARINE AIR CORPS STATION, CHERRY POINT, N. C. - 1968

Industrial Waste - Station 16611

NARF, Air Frame Division, Pollution Abatement Sewer Lift Station

Date	10/3	10.3	10/4	10/4	10/4	10/5	10/5
Time	1510	2120	840	900	2238	845	1535
Period (Hr.)	grab	12.5	grab	11.7	11.5	11.7	6.8
Flow (1000 gal.)		23		15	29		
pH		6.5		6.7	7.3	6.8	7.4
COD mg/l		95		610	1060	2280	1920
pounds		18		79	260		
Phenol mg/l		1.3		1.2	800	670	6.7
pounds		0.2		0.1	200		
Cyanides mg/l		0.06		< 0.01	< 0.01	0.03	0.02
pounds		< 0.1		< 0.1	< 0.1		
Total Oil mg/l	40		19				
pounds							
Organic N mg/l		1.1		0.9	1.0	0.7	0.9
pounds		< 1		< 1	< 1		
Total P mg/l		5.2		2.1	14.0	2.8	4.0
pounds		1.0		0.2	3.4		
Copper mg/l		0.10		0.05	0.20	0.09	0.20
pounds		< 0.1		< 0.1	< 0.1		
Total Chromium mg/l		4.6		2.1	3.6	2.0	< 0.1
pounds		< 1		< 1	< 1		
Lead mg/l		0.16		< 0.01	0.19	< 0.01	< 0.01
pounds		< 0.1		< 0.1	< 0.1		
Nickel mg/l		< 0.1		< 0.1	0.1	0.1	< 0.1
pounds		< 1		< 1	< 1		
Cadmium mg/l		0.26		< 0.01	0.22	< 0.01	< 0.01
pounds		< 0.1		< 0.1	< 0.1		
Zinc mg/l		0.38		0.23	0.96	0.30	0.10
pounds		< 0.1		< 0.1	0.2		

Table D-26.

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

Industrial Waste - Station 12801

Naval Air Rework Facility, Air Frame Division, Stripping Shelter.

Discrete Samples

Date	9/30	10/1	10/2	Average
Time	1515	1009	1010	
pH			7.4	7.4
COD	2470	6300		4300
Phenol		2.6	1.90	2.25
Total Oil		86		86
Organic N	3.0			3.0
Total P	8.50			8.50
Copper	0.01	0.10		0.05
Total Chromium	< 0.1	24.0		12.0
Lead	0.15	0.55		0.35
Nickel	< 0.1	< 0.1		< 0.1
Cromium	< 0.01	0.32		0.16
Zinc	0.23	4.60		2.41

Chemical analyses are recorded as mg/l except pH.

Table D-27.
MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

Industrial Waste - Station 24503 — Naval Air Rework Facility, Air Frame Division, Final Finish Storm Sewer

Date	9/30	9/30	10/1	10/2	10/3	10/4	10/5
Time	905	1500	1610	1550	1620	1335	1540
Period (Hr.)	grab	6.0	grab	6.7	7.7	4.5	6.9
Flow (1000 gal.)	2	2	2	2	2	2	2
pH	7.2	7.6	6.0		7.6	7.4	7.5
COD mg/l	920	500	770	27	64	30	1960
pounds	15	8	12	< 1	1	< 1	32
Phenol mg/l		0.05	0.16	< 0.01	0.03	10.5	26.8
pounds		< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.4
Cyanides mg/l		< 0.01	0.01		0.01	< 0.01	0.01
pounds		< 0.1	< 0.1		< 0.1	< 0.1	< 0.1
Total Oil mg/l	10	37	3		7	6	16
pounds	< 1	< 1	< 1		< 1	< 1	< 1
Organic N mg/l	6.6	4.3	1.3	0.6	0.8	1.7	2.3
pounds	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Total P mg/l	0.34	0.16	0.18	0.07	9.4	53.0	4.0
pounds	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.8	< 0.1
Copper mg/l	0.20	0.07	0.08	< 0.01	1.30		0.80
pounds	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1
Total Chromium mg/l	< 0.1	< 0.1	29.0	0.8	7.6		< 0.1
pounds	< 1	< 1	< 1	< 1	< 1		< 1
Lead mg/l	0.28	0.72	< 0.01	< 0.01	< 0.01		0.05
pounds	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1
Nickel mg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1
pounds	< 1	< 1	< 1	< 1	< 1		< 1
Cadmium mg/l		< 0.01	< 0.01	< 0.01	< 0.01		< 0.01
pounds		< 0.1	< 0.1	< 0.1	< 0.1		< 0.1
Zinc mg/l	1.10	0.48	8.60	0.27	2.90		0.45
pounds	< 0.1	< 0.1	0.1	< 0.1	< 0.1		< 0.1

Table D-28.
MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

Industrial Waste - Station 13701 — Naval Air Rework Facility, Air Frame Division, Storm Sewer

Date	10/1	10/1	10/2	10/2	10/3	10/3	10/3	10/3	10/4	10/5	10/5
Time	925	1500	935	940	920	1117	1337	1440	925	900	1555
Period (Hr.)	24.0	grab	grab	23.7	23.7	grab	grab	grab	24.0	grab	8.0
Flow (1000 gal.)	130			130	130				130		52
pH	7.6			7.6	7.4				7.4		7.4
COD mg/l	280			130	130				210	88	480
pounds	300			140	140				230		210
Phenol mg/l				16.70	4.70					2.00	8.00
pounds				18.1	5.0						3.4
Cyanides mg/l	< 0.01			< 0.01	< 0.01				< 0.01	0.04	0.03
pounds	< 0.1			< 0.1	< 0.1				< 0.1		< 0.1
Total Oil mg/l		4000	13			21	18	11		7	
pounds											
Organic N mg/l				0.9	1.0					2.4	1.9
pounds				< 1	1						< 1
Total P mg/l				2.8	2.20					0.49	1.50
pounds				3.0	2.3						0.6
Copper mg/l	0.01			0.09	0.02					0.06	
pounds	< 0.1			< 0.1	< 0.1						
Total Chromium mg/l	< 0.1			< 0.1	< 0.1					1.5	
pounds	< 1			< 1	< 1						
Lead mg/l	< 0.01			0.08	< 0.01					1.40	
pounds	< 0.1			< 0.1	< 0.1						
Nickel mg/l	< 0.1			< 0.1	< 0.1					< 0.1	
pounds	< 1			< 1	< 1						
Cadmium mg/l	< 0.01			< 0.01	< 0.01					< 0.01	
pounds	< 0.1			< 0.1	< 0.1						
Zinc mg/l	0.12			0.09	0.11					0.76	
pounds	0.1			< 0.1	0.1						

TABLE D-29 .

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

INDUSTRIAL WASTE - STATION 10C51 NAVAL AIR REWORK FACILITY, POLLUTION ABATEMENT PLANT PUMP SUCTION.

DATE	TIME	PERICD HOURS	FLOW 1000 GAL	PH	BOD MG/L	BOD POUNDS	COD MG/L	COD POUNDS	PHENOL MG/L	PHENOL POUNDS	TOTAL OIL MG/L	TOTAL OIL POUNDS
12 5	2345	8.0	31.	7.9	300.	78.	620.	161.	40.00	10.4	110.	28.
12 6	740	8.0	25.	7.2	390.	84.	850.	183.	29.00	6.2	12.	2.
12 6	1555	8.0	16.	7.2	440.	61.	740.	103.	21.00	2.9	77.	10.
12 6	2338	8.0	16.	10.4	260.	36.	660.	92.	34.00	4.7	78.	10.
12 7	800	8.0	22.	8.4			270.	51.	70.00	13.3	9.	1.
12 7	1555	8.0	31.	7.7			620.	161.	93.00	24.1	92.	23.
12 7	2345	8.0	31.	7.6			510.	132.	59.00	15.3	42.	10.
12 8	740	8.0	31.	7.3			440.	114.	110.00	28.6	79.	20.
12 8	1555	8.0	29.	7.4			90.	22.	16.00	3.9	6.	1.
12 8	2340	8.0	27.	7.6			340.	77.	5.30	1.2	4.	0.
12 9	755	8.0	27.	7.5			630.	143.	7.20	1.6	8.	1.
12 9	1550	8.0	28.	7.4			370.	88.	52.00	12.4	60.	14.
12 9	2355	8.0	26.	7.7			560.	122.	41.00	8.9	24.	5.
12 10	750	8.0	26.	7.2			270.	59.	15.00	3.3	5.	1.
12 10	1550	8.0	26.	7.6			560.	124.	12.00	2.6	93.	20.
12 10	2350	8.0	27.	8.1			2600.	591.	12.00	2.7	61.	13.
12 11	745	8.0	26.	7.3			1000.	220.	12.00	2.6	5.	1.
12 11	1535	8.0	25.	8.3			830.	179.	59.00	12.7	130.	28.
12 11	2345	8.0	26.	8.5			170.	37.	56.00	12.2	94.	20.
12 12	800	8.0	26.	8.2			1500.	327.	34.00	7.4	120.	26.
12 12	1555	8.0	26.	3.6			410.	90.	34.00	7.4	74.	16.
12 12	2330	8.0	28.	6.4			610.	146.	110.00	26.4	69.	16.

TABLE D-30

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

INDUSTRIAL WASTE - STATION 10051 NAVAL AIR REWORK FACILITY, POLLUTION ABATEMENT PLANT PUMP SUCTION.

DATE	TIME	PERIOD HOURS	COPPER MG/L	COPPER POUNDS	TOTAL CHROMIUM MG/L	TOTAL CHROMIUM POUNDS	ZINC MG/L	ZINC POUNDS
12 5	2345	8.0	0.08	0.0	1.0	0.	0.24	0.0
12 6	740	8.0	0.03	0.0	0.4	0.	0.12	0.0
12 6	1555	8.0	0.08	0.0	1.0	0.	0.80	0.1
12 6	2338	8.0	0.10	0.0	1.4	0.	0.90	0.1
12 7	800	8.0	0.04	0.0	1.0	0.	0.85	0.1
12 7	1555	8.0	0.04	0.0	1.0	0.	0.14	0.0
12 7	2345	8.0	0.04	0.0	3.1	0.	0.48	0.1
12 8	740	8.0	0.02	0.0	17.2	4.	0.32	0.0
12 8	1555	8.0	0.01	0.0	1.8	0.	0.07	0.0
12 8	2340	8.0	0.01	0.0	0.4	0.	0.06	0.0
12 9	755	8.0	0.01	0.0	0.5	0.	0.14	0.0
12 9	1550	8.0	0.05	0.0	0.9	0.	0.26	0.0
12 9	2355	8.0	0.07	0.0	2.0	0.	0.16	0.0
12 10	750	8.0	0.05	0.0	1.2	0.	0.08	0.0
12 10	1550	8.0	0.10	0.0	1.8	0.	0.11	0.0
12 10	2350	8.0	0.08	0.0	1.2	0.	0.11	0.0
12 11	745	8.0	0.03	0.0	1.1	0.	0.07	0.0
12 11	1535	8.0	0.04	0.0	0.9	0.	0.18	0.0
12 11	2345	8.0	0.04	0.0	1.0	0.	0.17	0.0
12 12	600	8.0	0.01	0.0	0.7	0.	0.07	0.0
12 12	1555	8.0	0.30	0.0	1.3	0.	3.60	0.7
12 12	2330	8.0	0.20	0.0	1.6	0.	0.70	0.1

TABLE D-31 .

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

INDUSTRIAL WASTE - STATION 10052 NAVAL AIR REWORK FACILITY, POLLUTION ABATEMENT PLANT CLARIFIER EFFLUENT

DATE	TIME	PERIOD HOURS	FLOW 1000 GAL	PH	COD MG/L	COD POUNDS	PHENOL MG/L	PHENOL POUNDS	TOTAL OIL MG/L	TOTAL OIL POUNDS
12 5	2330	8.0	31.	8.7	900.	234.	48.00	12.4	71.	18.
12 6	750	8.0	25.	7.6	650.	140.	28.00	6.0	13.	2.
12 6	1600	8.0	16.	8.1	570.	79.	20.00	2.8	50.	7.
12 6	2330	8.0	16.	8.8	600.	84.	26.00	3.6	48.	6.
12 7	755	8.0	22.	7.7	280.	53.	70.00	13.3	8.	1.
12 7	1600	8.0	31.	7.3	600.	156.	89.00	23.1	72.	18.
12 7	2330	8.0	31.	7.6	500.	130.	49.00	12.7	36.	9.
12 8	745	8.0	31.	7.3	480.	124.	110.00	28.6	9.	2.
12 8	1600	8.0	29.	7.4	100.	24.	17.00	4.2	4.	0.
12 8	2330	8.0	27.	7.4	240.	54.	5.00	1.1	4.	0.
12 9	755	8.0	27.	7.0	570.	130.	7.00	1.5	37.	8.
12 9	1550	8.0	28.	7.1	300.	72.	48.00	11.5	37.	8.
12 9	2350	8.0	26.	7.4	480.	104.	39.00	8.5	75.	16.
12 10	745	8.0	26.	7.2	260.	57.	16.00	3.5	5.	1.
12 10	1552	8.0	26.	7.0	330.	73.	12.00	2.6	29.	6.
12 10	2335	8.0	27.	7.4	2000.	455.	12.00	2.7	54.	12.
12 11	740	8.0	26.	7.4	930.	204.	6.00	1.3	3.	0.
12 11	1530	8.0	25.	7.3	530.	114.	42.00	9.0	53.	11.
12 11	2340	8.0	26.	7.2	410.	89.	62.00	13.5	57.	12.
12 12	800	8.0	26.	7.1	1100.	240.	26.00	5.6	6.	1.
12 12	1555	8.0	26.	6.3	190.	41.	34.00	7.4	23.	5.
12 12	2330	8.0	28.	6.7	450.	108.	86.00	20.6	47.	11.

TABLE D-32 .

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

INDUSTRIAL WASTE - STATION 10052 NAVAL AIR REWORK FACILITY, POLLUTION ABATEMENT PLANT CLARIFIER EFFLUENT

DATE	TIME	PERIOD HOURS	COPPER MG/L	COPPER POUNDS	TOTAL CHROMIUM MG/L	TOTAL CHROMIUM POUNDS	ZINC MG/L	ZINC POUNDS
12 5	2330	8.0	0.10	0.0	1.0	0.	0.33	0.0
12 6	750	8.0	0.03	0.0	0.4	0.	0.16	0.0
12 6	1600	8.0	0.06	0.0	0.8	0.	0.70	0.0
12 6	2330	8.0	0.10	0.0	1.2	0.	3.60	0.5
12 7	755	8.0	0.04	0.0	1.1	0.	1.00	0.1
12 7	1600	8.0	0.04	0.0	0.9	0.	1.00	0.2
12 7	2330	8.0	0.04	0.0	1.3	0.	0.19	0.0
12 8	745	8.0	0.03	0.0	16.2	4.	0.70	0.1
12 8	1600	8.0	0.04	0.0	2.0	0.	0.11	0.0
12 8	2330	8.0	0.10	0.0	0.4	0.	0.09	0.0
12 9	755	8.0	0.02	0.0	0.6	0.	0.17	0.0
12 9	1550	8.0	0.06	0.0	0.8	0.	0.29	0.0
12 9	2350	8.0	0.10	0.0	1.8	0.	0.22	0.0
12 10	745	8.0	0.05	0.0	1.3	0.	0.13	0.0
12 10	1552	8.0	0.10	0.0	2.1	0.	0.38	0.0
12 10	2335	8.0	0.10	0.0	1.2	0.	0.31	0.0
12 11	740	8.0	0.04	0.0	1.1	0.	0.15	0.0
12 11	1530	8.0	0.04	0.0	0.6	0.	0.26	0.0
12 11	2340	8.0	0.04	0.0	0.6	0.	0.48	0.1
12 12	600	8.0	0.02	0.0	0.3	0.	0.32	0.0
12 12	1555	8.0	0.30	0.0	0.6	0.	1.00	0.2
12 12	2330	8.0	0.20	0.0	1.3	0.	3.50	0.8

TABLE D-33

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

INDUSTRIAL WASTE - STATION 10052 EFFLUENT -- TREATMENT CONSISTED OF AIR.

PERCENT REDUCTIONS

DATE	TIME	COD	PHENOL	TOTAL OIL	TOTAL CR
12	8 1600	-11.11	-6.25	33.33	-11.11
12	8 2330	29.41	5.66	0.00	0.00
12	9 755	9.52	2.77	-362.50	-19.99
12	9 1550	18.91	7.69	38.33	11.11
12	9 2350	14.28	4.87	-212.50	10.00
12	10 745	3.70	-6.66	0.00	-8.33
AVERAGE		10.78	1.34	-83.88	-3.05

INDUSTRIAL WASTE - STATION 10052 EFFLUENT -- TREATMENT CONSISTED OF AIR, ALUM, AND SODA ASH.

PERCENT REDUCTIONS

DATE	TIME	COD	PHENOL	TOTAL OIL	TOTAL CR
12	10 1552	41.07	0.00	68.81	-16.66
12	10 2335	23.07	0.00	11.47	0.00
12	11 740	7.00	50.00	40.00	0.00
12	11 1530	36.14	28.81	59.23	33.33
AVERAGE		26.82	19.70	44.88	4.16

INDUSTRIAL WASTE - STATION 10052 EFFLUENT -- TREATMENT CONSISTED OF AIR, FERROUS SULFATE, ALUM, AND SODA ASH.

PERCENT REDUCTIONS

DATE	TIME	COD	PHENOL	TOTAL OIL	TOTAL CR
12	11 2340	-141.17	-10.71	39.36	40.00
12	12 800	26.66	23.52	95.00	57.14
12	12 1555	53.65	0.00	68.91	53.84
12	12 2330	26.22	21.81	31.88	18.75
AVERAGE		-8.65	8.65	58.79	42.43

TABLE D-34 .

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

INDUSTRIAL WASTE - STATION 10053 NAVAL AIR REWORK FACILITY, POLLUTION ABATEMENT SEWER HOLDING TANK DISCHARGE.

DATE	TIME	PERIOD HOURS	FLOW 1000 GAL	PH	COD MG/L	COD POUNDS	PHENOL MG/L	PHENOL POUNDS	TOTAL OIL MG/L	TOTAL OIL POUNDS	TOTAL CHROMIUM MG/L	TOTAL CHROMIUM POUNDS
12 4	2350	8.0	81.	7.1	400.	271.	18.00	12.2	42.	28.	0.7	0.
12 5	745	8.0	42.	8.2	80.	28.	1.00	0.3	8.	2.	0.4	0.
12 5	1550	8.0	95.	7.3	600.	476.	100.00	79.4	120.	95.	1.1	0.
12 5	2345	8.0	77.	8.0	490.	314.	49.00	31.4	95.	61.	1.1	0.
12 6	745	8.0	48.	7.4	460.	186.	27.00	10.9	9.	3.	0.4	0.
12 6	1555	8.0	87.	8.9	770.	558.	18.00	13.0	80.	58.	1.1	0.
12 6	2338	8.0	76.	8.3	430.	272.	31.00	19.6	78.	49.	1.4	0.
12 7	750	8.0	54.	8.0	230.	103.	58.00	26.1	6.	2.	0.8	0.
12 7	1600	8.0	97.	7.6	700.	569.	87.00	70.7	80.	65.	1.0	0.
12 7	2345	8.0	45.	7.6	680.	259.	58.00	22.1	43.	16.	3.2	1.
12 8	750	8.0	51.	7.2	510.	220.	110.00	47.5	12.	5.	17.2	7.
12 8	1555	8.0	46.	7.4	100.	38.	17.00	6.5	4.	1.	2.0	0.
12 8	2340	8.0	43.	7.6	200.	72.	5.10	1.8	20.	7.	0.4	0.
12 9	800	8.0	47.	7.3	580.	228.	7.00	2.7	13.	5.	0.5	0.
12 9	1550	8.0	84.	7.6	420.	295.	52.00	36.6	58.	40.	1.1	0.
12 9	2355	8.0	77.	7.3	520.	336.	42.00	27.1	78.	50.	2.2	1.
12 10	750	8.0	42.	7.3	230.	81.	13.00	4.5	1.	0.	1.2	0.
12 10	1550	8.0	74.	7.7	550.	341.	12.00	7.4	96.	59.	2.4	1.
12 10	2350	8.0	84.	8.0	2100.	1481.	12.00	8.4	36.	25.	1.4	0.
12 11	745	8.0	46.	7.6	960.	369.	5.80	2.2	6.	2.	1.2	0.
12 11	1534	8.0	91.	7.9	730.	555.	50.00	38.0	89.	67.	0.8	0.
12 11	2345	8.0	76.	7.7	760.	486.	62.00	39.7	120.	76.	0.8	0.
12 12	800	8.0	52.	7.7	160.	70.	30.00	13.1	11.	4.	0.6	0.
12 12	1550	8.0	89.	4.6	340.	252.	26.00	19.3	120.	89.	1.6	1.
12 12	2350	8.0	80.	6.8	520.	346.	80.00	53.3	75.	50.	2.0	1.

TABLE D-35 .

MARINE AIR CORPS STATION, CHERRY POINT, N.C. - 1968

INDUSTRIAL WASTE - STATION 10054 NAVAL AIR REWORK FACILITY, POLLUTION ABATEMENT SEWER TOTAL DISCHARGE.

DATE	TIME	PERIOD HOURS	FLOW 1000 GAL	PH	COD		PHENOL		TOTAL OIL		TOTAL CHROMIUM	
					MG/L	POUNDS	MG/L	POUNDS	MG/L	POUNDS	MG/L	POUNDS
12 4	2350	8.0	81.	7.5	320.	216.	17.00	11.5	41.	27.	0.7	0.
12 5	745	8.0	42.		90.	31.	2.00	0.7	13.	4.	0.4	0.
12 5	1550	8.0	95.	7.5	510.	405.	85.00	67.5	110.	87.	1.0	0.
12 5	2340	8.0	77.	8.2	480.	308.	50.00	32.1	98.	62.	1.2	0.
12 6	745	8.0	48.	7.3	1000.	406.	27.00	10.9	230.	93.	0.4	0.
12 6	1555	8.0	87.	8.4	630.	457.	21.00	15.2	75.	54.	1.0	0.
12 6	2335	8.0	76.	9.9	500.	316.	27.00	17.1	71.	45.	1.6	1.
12 7	750	8.0	54.	8.1	280.	126.	62.00	27.9	6.	3.	1.0	0.
12 7	1550	8.0	97.	7.6	770.	626.	91.00	73.9	110.	89.	1.1	0.
12 7	2340	8.0	45.	7.7	510.	194.	58.00	22.1	43.	16.	3.2	1.
12 8	750	8.0	51.	7.4	440.	190.	100.00	43.2	11.	4.	16.6	7.
12 8	1555	8.0	46.	7.5	100.	38.	48.00	18.5	5.	1.	2.2	0.
12 8	2338	8.0	43.	7.6	510.	183.	42.00	15.1	67.	24.	0.3	0.
12 9	755	8.0	47.	7.3	800.	314.	14.00	5.5	68.	26.	0.6	0.
12 9	1555	8.0	84.	7.6	420.	295.	17.00	11.9	58.	40.	1.1	0.
12 9	2330	8.0	77.	7.5	460.	297.	5.10	3.2	76.	49.	2.3	1.
12 10	755	8.0	42.		240.	84.	7.00	2.4			1.4	0.
12 10	1545	8.0	74.	8.9	430.	266.	11.00	6.8	9.	5.	2.3	1.
12 10	2345	8.0	84.	8.1	1900.	1340.	12.00	8.4	17.	11.	1.2	0.
12 11	740	8.0	46.	7.6	900.	346.	5.80	2.2	7.	2.	1.0	0.
12 11	1538	8.0	91.	7.9	630.	479.	50.00	38.0	90.	68.	0.9	0.
12 11	2345	8.0	76.	8.3	560.	358.	64.00	40.9	80.	51.	0.9	0.
12 12	805	8.0	52.	7.9	1100.	482.	31.00	13.5	4.	1.	0.6	0.
12 12	1555	8.0	89.	5.6	280.	208.	28.00	20.8	58.	43.	1.2	0.
12 12	2340	8.0	80.	7.1	460.	306.	79.00	52.7	64.	42.	1.5	1.

APPENDIX E

Sources of Pollutional Material from Naval Air Rework Facility

U. S. Marine Corps Air Station
Cherry Point, North Carolina

L. W. Muir, Chemist
T. J. Powers, Sanitary Engineer
Water, Sewage and Industrial Waste Section

APPENDIX E

Appendix E tabulates flow data, tank volumes, and kinds of chemicals used in the departments of NARF which use process water. A description of the sources of wastewater from the Air Frame Division is included.

WASTEWATER FROM NARF

PREPARATION OF AIRCRAFT FOR FINAL PAINTING

All magnesium and aluminum surfaces of aircraft are subject to corrosion attack even under painted surfaces by moisture, salt water, salt air and other operational environments. Paint and/or other protective coatings should be applied as soon as possible after the final chemical surface treatment.

These were the methods used at the Naval Air Rework Facility, Cherry Point, North Carolina, at the time of the survey, for the preparation of aluminum and/or magnesium metals and alloys for the final paint and/or other protective coatings of aircraft.

Precleaning

All of the oil and grease was removed from bare magnesium surfaces, using solvent-emulsion cleaner or water-emulsion cleaner or steam cleaning compounds. These compounds were applied by pressure nozzles with brushing and mopping and allowed to soak 10 to 15 minutes, but not dry on the surface; then rinsed thoroughly with clean water until all traces of cleaning compounds and dirt are removed.

Painted surfaces of magnesium and all aluminum surfaces were stripped using a paint remover (MIL-R 8633) containing

chlorinated hydrocarbons (methylene chloride), phenols or cresols, amines, ammonia, thinners, and emulsifiers. This material was sprayed or brushed on the surface to be cleaned, and then rinsed with clear water. Oil, grease and operational films were removed the same as from bare magnesium metal surfaces.

Corrosion Removal

On both magnesium and aluminum surfaces, heavy corrosion residues were removed by abrasive blast cleaning. Lighter corrosion residues on magnesium were removed by a 10 percent chromic acid, or from aluminum by (MIL-C 5410), phosphoric-citric acid, and Stoddard solvent mixed 1 to 1 or with water mixed 1 to 1. In both cases the acid solutions react with the corrosion residue and the surfaces were rinsed clean with water until all residue and chemicals were removed. These compounds (phosphoric-citric acid or chromic acid) were kept away from all operating mechanisms, seams and cracks as well as plated steel.

After paint had been removed from aluminum and/or magnesium surfaces, rinsed clean and dried, all traces of primer that might exist around rivet heads, etc., were removed by wiping with dope and lacquer thinner, cellulose nitrate (TT-T266) or cellulose acetate butyrate dope thinner (MIL T-6096).

Immediately after the removal of all corrosion, megnesium surfaces were chemically treated with Type I chrome pickle (1.5 lbs. sodium dichromate, 1.5 pints of nitric acid made up to one

gallon with water), and aluminum surfaces were chemically treated with a solution prepared from MIL C-5541, Alodine 1200 or Turco 4477 which is 40 percent chromium trioxide (28-1/2 lbs. of 40% CrO_3, and six pints of nitric acid made up to 150 gallons with water).

Cleaning Prior to Painting

Following reassembly and surface treatment and prior to the application of paint finishes, the aircraft were moved into a booth or other area suitable for painting. All body contact with the planes were avoided by use of white gloves and cheesecloth. The painting areas were as free of dirt, dust, lint, etc., as possible. The planes were wiped free of water drippage and allowed to dry. One hour before painting, any remaining chromic acid solution was removed by wiping the entire surface with clean cheesecloth damp with clean water and dried with clean cheesecloth. Bottom surfaces were checked for water or other drips. These were removed by blotting with cheesecloth or removed by blotting with cheesecloth moistened with toluol or lacquer thinner.

If aircraft surfaces were allowed to become contaminated prior to final painting, the surfaces were recleaned by using aqueous solutions of MIL-C 22543 (liquid emulsifying agent containing soap and water) or steam cleaning with MIL C-22542 (high pressure cleaner containing emulsifiers, solvents, silicates, phosphates, corrosion inhibitors and water). The sprays were kept

moving to prevent overheating the surface skin. All residues were flushed off with hot or cold water. The cleaned surfaces were subjected to a "water break test." All joint and fasteners were blown out with oil and water-free air before a solvent wipe-down using clean cheesecloth moistened with lacquer thinner (TT-T266).

PHYSICAL CHEMISTRY OF WASTE WATERS

Organic Compounds

The paint stripping compounds and the metal cleaning compounds contain methylene chloride, phenols (or cresols), hydrocarbon solvents, with traces of detergents and chromates. In the stripping operation, the reacted materials were rinsed off the craft or part and washed into the sewer. Most of this material went to the Pollution Abatement Plant. In the sewer line, at any of the sumps, pump wells, or at the holding tank, the methylene chloride and phenol without solvents will separate into a lower layer. Methylene chloride and phenol have variable partition solubilities in water in the presence of mixtures of acetone, methyl ethyl ketone, jet fuel, and other solvents. These enter the water or oil layer or remain in a separate layer depending on the equilibrium. Water seals used on certain dip tanks containing methylene chloride-phenol mixtures, indicate the solubility in water alone must be low. These factors account for the low values of methylene chloride and phenols reported in the wastewater at the outfall at the Pollution Abatement Plant (Sta. 25 or 10054).

Metals

The anodizing and deoxidizing of aluminum and other metal surfaces during chemical cleaning, corrosion control and prepaint treatment, increased the concentrations of chromium in the wastewater. In the plating shops, the "drag out" to wastewater includes chromium, nickel, cadmium, tin, copper, silver and gold. These metals would remain in solution at the normal 6-8 pH for the wastewater stream. The concentration of metals can be reduced by chemical treatment.

Table E-1 SUMMARY OF WASTEWATER FLOWS -
DISCHARGES TO POLLUTION ABATEMENT SYSTEM,
1661 LIFT STATION AND PNEUMATICS CLEANING AREA EVALUATION 1/

SOURCE OF DISCHARGE	Flow Rate Maximum (gals/min.)	Normal Operating Flow-Average per 8 Hour Shift (gals.)	Anticipated Total Flow-24-Hour Period (gals.)
137 Building:			
Pneumatics Cleaning & Metals Examination Area	35.0	17,000	26,000
1661 Lift Station:			
137 Building - Helicopter Rotor Blade Rework Shop	5.0	500	500
137 Building - Cleaning and Plating Shop 93103	30.0	10,000	30,000
424 Building - Aircraft Stripping Hanger	90.0	5,000	9,000
245 Building - Final Finish Hangar	--	3,000	7,000
1280 Building - Aircraft Stripping Shelter	80.0	19,000	29,000
Sub-Total Discharge from 16611 Lift Station	205	37,500	75,500
TOTAL DISCHARGE TO POLLUTION ABATEMENT SYSTEM FROM LIFT STATION AND PNEUMATICS CLEANING - BUILDING 137	250	54,500	101,500

1/ Columns may not add, due to rounding of significant figures.

Table E-1.1 Pneumatics Cleaning and Metal Examination Area

Building No. 137 — Drawing Sheet No. 22

Tank Number	Specific Compounds - Composition	Tank Volume(gals)
1	Degreaser - Trichloroethylene Water colled with 1/2" line	20
2	Turco 4338 Potassium Permanganate 7 - 9 oz/gal. Sodium Hydroxide 14 - 16oz/gal. Sodium Carbonate 14 -16 oz/gal.	55
3	Wash or Rinse Water 1/2" line flow when in use	50
4	Turco Transpo (Water Seal) Methylene Chloride with 15 to 20% phenol	55
5	Wash or Rinse Water Same as Tank 3	50
6	Turco Transpo (Water Seal) See Tank 4	55
7	Spray Rinse (Alphatic Naptha) This waste discarded after use.	
8	Zyglo Tank (10 gals. added since May)	50
9	Emulsifier (Magnaflux Corp.) (55 gals. added since May)	200
10	Washer and Drier 1" line full flow (50 psi) 2 hrs. per shift.	

WASTEWATER SOURCES

Waste Source	Estimated Flow (gpm)	Total Flow Per 8-Hr. Shift (gals.)	Total Flow Per 24-Hour Period (gals.)
Turco Rinse Tanks	10.0 (hose)	4,800	4,800
Cooling Coils	10.0	4,800	14,400
Parts Cleaning Spray Booth	15.0	7,200	7,200
Total Wastewater	35.0	16,800	26,400

First Downstream Sampling Point: 10054

Table E-1.2 Helicopter Rotor Blade Rework Shop

Building 137 Drawing Sheet No. 18

Tank Number	Contents	Specific Compounds
1	Cleaning	Soap & Water

WASTEWATER SOURCES

Waste Source	Estimated Flow (gpm)	Total Flow Per 8-Hr. Shift (gals.)	Total Flow Per 24-Hour Period (gals.)
Tank 1	1.0 - 5.0 (max)	480	480
Total Wastewater	1.0	480	480

First Downstream Sampling Point: 13720

Table B-1.3 Cleaning and Plating Shop 93103

Building No. 137 Drawing Sheet No. 17

Tank No.	Specific Compounds - Composition	Tank Volume (gals)
1	Hard Anodize Sulfuric Acid 27 - 29 oz/gal. Oxalic Acid 1.5 - 2.5 oz/gal.	152
2	Alodine Rinse MIL-C5541 Alodine 1200 (40%CRO_3) 0.05 - 0.10 oz/gal.	888
3	Alodine Tank MIL-C5541 Alodine 1200 (Chromate) 12-1/2 lbs/100 gal. pH (Nitric Acid) 1.5 - 2.3 oz/gal.	888
4	Turco Smutt Go #4 Sulfuric Acid 7 gal/100 gal. Turco Smutt Go #4 30 lbs/100 gal.	162
5	Ammonium Nitrate 1 lb/gal.	293
6	Hot Water Rinse	628
7	Chromic Acid CrO_3 13 - 14 oz/gal. H_2SO_4 1/2 teaspoon	140
8	Cold Water Wash	116
9	Cadmium Plate Barrel NaOH 1 - 2 oz/gal. NaCN 20 oz/gal. CdO 4 - 7 oz/gal.	116
11	Cadmium Plate Still NaOH 1 - 2 oz/gal. CaCN 9 -12 oz/gal. CdO 3 - 4 oz/gal.	995
12	Cadmium Plate Still NaOH 1 - 2 oz/gal. NaCN 9 -12 oz/gal. CdO 3 - 4 oz/gal.	388
13	Not Used.	

Table E-1.3 (Cont.) Cleaning and Plating Shop 93103

Building No. 137 — Drawing Sheet No. 17

Tank No.	Specific Compounds - Composition	Tank Volume (gals)
14	Nitric Acid HNO_3 25-35%	150
15	Hydrochloric Acid 20%	160
16	Water Rinse	160
17	Anodex Chromates 6 - 14 oz/gal Caustic & Inhibitors	140
18	Preservation Oil Light Motor Oil	50
19	Cold Water Rinse	628
20	Metal Cleaning Silicate Soap MIL-M-7752 4 - 6 oz/gal	628
21	Trichloroethylene	140
22	Hot Water Rinse	1360
23	Anodizing Tank Chromic Acid 13 oz/gal	1360
24	Cold Water Rinse	140
25	Nickel Plate Nickel Sulfate 14 - 20 oz/gal. Ammonium Chloride 2.0 - 5.6 oz/gal. Boric Acid 3.0 - 7.0 oz/gal.	140
26	Nickel Strip Reliance Chem. Co. - Nickel Strip Sulfuric Acid and Glycerine	40
27	Tin Plate Sodium Stannate 12 - 16 oz/gal. NaOH 0.5 - 2.0 oz/gal. NaAcetate 1.5 - 3.0 oz/gal.	75

Table E-1.3 (Cont.) Cleaning and Plating Shop 93103

Building No. 137 — Drawing Sheet No. 17

Tank No.	Specific Compounds - Composition	Tank Volume (gals)
28	Electroless Nickel Nickel Chloride 4 - 6 oz/gal. Sodium Hypophosphite 1.3 - 2.6 oz/gal. Glycollic Acid 5.7 - 7.7 oz/gal.	91
29	Cold Water Rinse	150
30	Copper Plate Copper Cyanide 2.5 - 4.5 oz/gal. Sodium Cyanide 2.2 - 3.2 oz/gal. Sodium Hydroxide 0.5 - 1.5 oz/gal.	388
31	Nitric Acid	150
32	Cold Water Rinse	400
33	Caustic Soda Sodium Hydroxide (Not used)	150
34	Chrome Plate (Hi Speed) Chromium (110) 40 - 45 oz/gal.	170
35	Chrome Plate Chromium (110) 40 - 45 oz/gal	575
36	Wax Tank	Small
37	Chromic Acid (Bright) Chromic Acid 12 - 13 oz/gal. Sulfuric Acid 1/8-1/4 oz/gal.	260
38	Phosphating Solution Mil-T 5002 55 lbs/100 gal. Contains phosphate, nickel, manganese and some nitrate	300

Table E-1.3 (Cont.) Cleaning and Plating Shop 93103

WASTEWATER SOURCES			
Waste Source	Estimated Flow (gpm)	Estimated Total Flow per 8-Hour Shift(gals.)	Estimated Total Flow per 24-Hour Period(gals.)
Tank 6	0.1	48	144
8	2.2	1,056	3,168
16	3.4	1,632	4,896
19	7.6	3,648	10,944
22	0.1	48	144
24	1.5	720	2,160
29	4.0	1,920	5,760
32	1.7	816	2,448
Total Wastewater	20.6 gpm	9,888	29,664
Est. Maximum	30.0		

First Downstream Sampling Point: 13720

Table E-1.4

Aircraft Stripping Hangar

Building No. 424 — WASTEWATER SOURCES — Drawing Sheet No. 2

Waste Source	Estimated Flow (gpm)	Estimated Total Flow per 8-Hour Shift(gals.)	Estimated Total Flow per 24-Hour Period(gals.)
Washdown with hoses	0.0 - 90.0	4,800	9,000
Total Wastewater	10 gpm (est)	4,800	9,000

First Downstream Sampling Point: 16611

Materials Used in This Area

Acetate Thinners

Nitrate Thinners

Acrylic Thinners

Naphtha, Aliphatic

Turco 5122

Paint - Zinc chromate for corrosion control

Table E-1.5 **Final Finish Hangar**

Building No. 245 Drawing Sheet No. 2

WASTEWATER SOURCES

Waste Source	Estimated Flow (gpm)	Estimated Total Flow per 8-Hour Shift(gals.)	Estimated Total Flow per 24-Hour Period(gals.)
Discharge from Paint Spray Area	5.0 (ave)	2,400	7,200
Total Wastewater	5.0 gpm(Est.)	2,400	7,200

First Downstream Sampling Point: 16611

Materials Used in This Area

Paint Solvents

Zinc chromate

Alodine treatment
28-1/2 lbs. Turco 4477 (40% CrO_3)
6 pints nitric acid
150 gallons of water
stir and age 24 hours

One to two baths a week are used to spray on aircraft.

Table E-1.6 **Aircraft Stripping Shelter**

Building No. 1280 Drawing Sheet No. 2

WASTEWATER SOURCES

Waste Source	Estimated Flow (gpm)	Estimated Total Flow per 8-Hour Shift(gals.)	Estimated Total Flow per 24-Hour Period(gals.)
Washdown by Hoses	37.2 - 80.0	19,200	28,800
Total Wastewater	40 gpm(Est.)	19,200	28,800

First Downstream Sampling Point: 12801

Materials Used in This Area

Pennsalt 732

Turco 5122 or 4778

Water emulsion cleaner

Phosphonic & citric acids, detergent mineral spirits

Table E-2 SUMMARY OF WASTEWATER FLOWS - DISCHARGES TO POLLUTION ABATEMENT SYSTEM, 13301 STATION EVALUATION 1/

SOURCE OF DISCHARGE	Flow Rate Maximum (gals/min.)	Normal Operating Flow-Average per 8 Hour Shift (gals.)	Anticipated Total Flow-24-Hour Period (gals.)
133 Building:			
Accessory Cleaning & Metals Examination Shop 96103	5.0	1,900	1,900
Jet Engine Test Cells	2.0	1,000	1,000
Bearing Shop	--	--	--
Plate Shop and Paint Shop (Tanks 40 - 53)	44.0	19,000	19,000
Plate Shop (Tanks 20 - 39, and 53 - 57)	30.0	13,000	17,000
Plate Shop (Tanks 1 - 19)	26.0	11,000	11,000
Engine Precleaning	5.0	1,000	1,000
Chemical Cleaning Shop Facility	41.0	20,000	59,000
Examination Shop (Tanks 1 - 16, Air-Jets)	19.0	9,000	9,000
Examination Shop (Jet Wash - Final Examination)	2.1	1,000	1,000
TOTAL WASTEWATER FLOW STATION 13301	170	77,000	120,000

1/ Columns may not add, due to rounding of significant figures.

Table E-2.1 Accessory Cleaning & Metals Examination Shop 96103

Building No. 133 Drawing Sheet No. 11

Tank Number	Contents	Specific Compounds
---	Magnaflux	
ZA - 28	Zy Glo Unit	
---	Hot Water	
---	Phosphoric Acid	
---	Sodium Hydroxide	

WASTEWATER SOURCES

Waste Source	Estimated Flow (gpm)
All Above Overflows	3 - 5 gpm

Total Wastewater 4 gpm(Est.) 8 hr. Shift Total 1,920 gal/day

First Downstream Sampling Point: 13301

Table E-2.2 Jet Engine Test Cells

Building No. 133 WASTEWATER SOURCES Drawing Sheet No. 13

Waste Source	Estimated Flow(gpm)		
Oil Separator	1		
Oil Separator	1		
Total Wastewater	2	gpm (Est)	1,000 gal/day

First Downstream Sampling Point: 13301

Table E-2.3 Bearing Shop 96305

Building No. 133		Drawing Sheet No. 12
Tank No.	Specific Compounds	Tank Volume (gals)
1	Trichloroethylene 1/2" line (cooling water) return to fountain	3
2	Hot Oil VV/L/800	110
3	Varsol Rinse	110
4	Carbon Removal (Transpo) (Water Seal)	110
5	Varsol Rinse	110
6	Varsol Rinse	110
	Hot Oil System 180°F VV/L/800 (MIL-L-644)	
7	Hot Oil VV/L/800	150
8	Hot Oil VV/L/800	60
9	Hot Oil VV/L/800	150
10	Varsol Rinse	110
11	Soap Wash Nonionic detergent 1 oz/10 gals. Immunal 1 oz/10 gals.	10
12	Hot Water Wash	110
13	2 Propanol (isopropylalcohol)	5
14	2 propanol (isopropylalcohol)	5
	200°C Oven	

Table E-2.4 Plate Shop 96103 and Paint Shop 96103

Building No. 133 Drawing Sheet No. 9

Tank No.	Specific Compounds - Composition	Tank Volume (gals)
40	Degreaser Trichloroethylene	300
41	Sodium Dichromate Sodium Dichromate 13 - 26 oz/gal.	530
42	Water Rinse	530
43	Potassium Bifluoride Potassium Bifluoride 6.6 - 7.3 oz/gal.	1060
44	Water Rinse	1060
45	C-109 Soap (Aluminum Metal Cleaner) C-109 Conc. Silicate 4.-6. oz/gal.	1060
46	Hot Water	1060
47	Water Rinse	1060
48	Chromic Acid Chromium Trioxide 20 - 24 oz/gal.	530
49	Alodine (Chromic Acid)(40%) Alodine 1200 12-1/2 lbs/100 gal.	530
50	Blueing Sodium Hydroxide 75 - 80 oz/gal. Sodium Nitrate 40 - 50 oz/gal.	180
51	Water	180
52	Hydrochloric Acid 20%	180
53	Nickel Strike Nickel Chloride 6 - 9 oz/gal. Hydrochloric Acid 1 - 3 oz/gal.	530

Table E-2.4 (Cont.) Plate Shop 96103 and Paint Shop 96103

Building No. 133		Drawing Sheet No. 9
Tank No.	Specific Compounds - Composition	Tank Volume (gals)
New Tank	For Alloys having Raw Earths Iridite (C_rO_3) 5 oz/gal. Hydrochloric Acid 2 oz/gal. ARP (Detergent) .034 oz/gal.	530 Not in Use

WASTEWATER SOURCES

Waste Source	Estimated Flow (gpm)	Maximum Flow (gpm)	Flow Average Per Shift (gpm)	8-Hr. Flow Average Per Day(gals)
Tank 42	9.70 8.2	10.0	9.0	4,320
44	not in use	---	---	---
47	7.50 6.8	7.5	7.2	3,456
46	4.50 9.2	9.2	7.0	3,360
51	10.30 9.2	10.3	10.0	4,800
Paint Spray Booth	5.65 7.0	7.0	6.4	3,072
Total Wastewater	gpm(est)	44.0	39.6	19,008

First Downstream Sampling Point: 13304 19,008 gal/day

Table E-2.5 Plate Shop 96103

Building No. 133 Drawing Sheet No. 9

Tank Number	Specific Compounds - Composition	Tank Volume (gals)
20	Water Rinse	45
21	Rectifier (Not a bath)	
22	Wax High Temperature	100 (est)
23	Chromic Acid Chromium 110-40-45 oz/gal.	260
24	Chromic Acid Same as 23	112
25	Water Rinse	100
26	Hydrochloric Acid	100
27	Water Rinse	140
28	Anodex Caustic Soda 6-14 oz/gal. Inhibitors	200 (est)
29	Degreaser Trichloroethylene	100 (est)
30	Hot Water Rinse	100
31	Nickel Plate Bright Nickel Sulfate 30 - 60 oz/gal. Nickel Chloride 6 - 8 oz/gal.	112
32	Cadmium Strip Ammonium Nitrate 16 oz/gal.	70 (est)
33	Tin Plate Sodium Stannate 12 - 16 oz/gal. Sodium Hydroxide 0.5-2.0 oz/gal. Sodium Acetate 1.5-3.0 oz/gal.	112

Table E-2.5 (Cont.) Plate Shop 96103

Building No. 133 Drawing Sheet No. 9

Tank Number	Specific Compounds - Composition	Tank Volume (gals)
34	Cadmium Plating (Barrel) Cadmium Oxide 4.7 - 7.0 oz/gal. Sodium Cyanide 1.0 - 2.0 oz/gal. Sodium Hydroxide 1.0 - 2.0 oz/gal.	112
35	Cadmium Plating (Still) Cadmium Oxide 3 - 4 oz/gal. Sodium Cyanide 9 - 12 oz/gal. Sodium Hydroxide 1- 2 oz/gal.	388
37	Chromic Acid Chromium Trioxide 30 - 36 oz/gal. Sulfuric Acid .3 - .36 oz/gal.	410
38	Chromic Acid Same as 37	370
39	----	
36	Water Rinse	112
53	Nickel Strike Nickel Chloride 30 - 33 oz/gal.	64
54	Anodex Caustic Soda 6 - 14 oz/gal. Inhibitors	70 (est)
55	Water Rinse	112
56	Hydrochloric Acid	70
57	Nickel Plate Hard Nickel Sulfate 14 - 20 oz/gal. Ammonium Chloride 2 - 5 oz/gal. Boric Acid 3 - 7 oz/gal.	140

Table E-2.5 (Cont.) Plate Shop 96103

WASTEWATER SOURCES

Waste Source	Estimated Flow(gpm)		Maximum Flow(gpm)	Flow Average Per Shift (gpm)	8-Hr Flow Average Per Day(gals)	16 Off Shift Flow (gals)
Tank 55	4.45	3.9	4.5	4.2	2,016	
20	4.45	3.9	4.5	4.2	2,016	
36	2.12	2.55	2.6	2.3	1,104	
25	5.55	2.0	5.6	4.0	1,920	
27	6.82	7.5	7.5	7.2	3,456	
29	3.96	---	4.0	4.0	1,920	3,840
30	Low Flow	0.81	1.0	0.8	384	
Total Wastewater		gpm(Est)	29.7	26.7	12,816	3,840

First Downstream Sampling Point: 13304 Total 24-Hr. Period: 16,656 gal/day

Table E-2.6

Plate Shop 96103

Building No. 133 — Drawing Sheet No. 9

Tank Number	Specific Compounds - Composition	Tank Volume (gals)
1	----	
2	Nitric Acid (Not in use)	---
3	Water Rinse	60
4	Anodex Caustic Soda 6 - 14 oz/gal. Inhibitor	60
5	Water Rinse	30
6	Hydrochloric Acid 20%/vol.	40
7	Copper Strike Copper Cyanide 2.8 - 5.5 oz/gal. Sodium Cyanide 1.0 - 1.3 oz/gal. Sodium Hydroxide 0.5 - 1.5 oz/gal.	60
8	Water Rinse	60
9	Silver Strike Silver Cyanide 0.3 - 0.5 oz/gal. Potassium Cyanide 7.8 - 9.0 oz/gal.	45
10	Silver Plate Silver Cyanide 6.2 - 12 oz/gal. Potassium Cyanide 12 - 16 oz/gal.	225
11	Chromic Acid Chromium Trioxide 12 - 13 oz/gal. Sulfuric Acid 1/8 - 1/4 oz/gal.	70
12	Nickel Strip (No Analyses) Copper Sulfate Sulfuric Acid	60
13	Silver Strip (No Analyses) Sodium Cyanide Sodium Hydroxide	60

Table E-2.6 (Cont.) Plate Shop 96103

Building No. 133 Drawing Sheet No. 9

Tank Number	Specific Compounds - Composition	Tank Volume (gals)
14	Water Rinse	60
15	Copper Strip (No Analysis)	70
16	Lead Plating Stannous Tin 0.3 - 0.8 oz/gal. Lead 11.8 -12.3 oz/gal. Fluoborate 4.4 - 6.4 oz/gal. Boric Acid 2.4 - 4.4 oz/gal.	45
17	Lead Plating See 16	56
18	Water Rinse	100
19	Hydrochloric Acid 20%	30

WASTEWATER SOURCES

Waste Source	Estimated Flow (gpm)	Maximum Flow (gpm)	Flow Average Per Shift (gpm)	8-Hr Flow Average Per Day (gals)
Tank 18	2.12 2.20	2.2	2.2	1,056
8	10.00 10.50	10.5	10.2	4,896
5	6.01 2.85	6.0	4.4	2,112
3	3.07 3.20	3.3	3.2	1,536
14	3.57 3.50	3.6	3.5	1,680
Total Wastewater	gpm(est)	25.6	23.5	11,280

First Downstream Sampling Point: 13304

Table E-2.7 **Engine Precleaning**

Building No. 133 Drawing Sheet No. 5

Specific Compounds

Steam Cleaning Compound 4998	500 gal/yr.
Methyl Ethyl Ketone	700 gal/yr.

WASTEWATER SOURCES

Waste Source	Estimated Flows (gpm)
Steam and Chemical Treatment Lines	1 - 5
Total Wastewater	2 gpm (Est) 8-Hr. Shift Average — Total 960 gal/day

First Downstream Sampling Point 13303

Table E-2.8 Chemical Cleaning Facility Shop 96101

Building No. 133 Drawing Sheet No. 6

Tank No.	Specific Compounds - Composition	Tank Volume (gals)
1	Degreaser Trichloroethylene	500
2	Turco 4008 Alkali with 3 to 5% phenol	1000
3	Hot Water (Spray)	
4	Turco 4008 See Tank 2	1000
5	Hot Water Spray	
6	Turco 3823 Phenols 15 - 20% Borates 0.1% Chromium$_6$ 0.1% Soaps	1000
7	Turco 4338 Potassium Permanganate 7 - 9 oz/gal. Sodium Hydroxide 14 -16 oz/gal. Sodium Carbonate 14 -16 oz/gal.	1000
8	Hot Water (Spray)	
9	Nitric Acid 20 - 25%	1000
10	Hot Water Spray	
11	Borzin Aqua Flux Ortho Dichlorobenzene Soaps	1000
12	Hot Water Spray	
13	Turco Transpo Methylene Chloride base Phenol 15 - 20% Chromate 1.4%	1000

Table E-2.8 (Cont.) Chemical Cleaning Facility Shop 96101

Building No. 133		Drawing Sheet No. 6
Tank No.	Specific Compounds - Composition	Tank Volume (gals)
14	Caustic Soda Sodium Hydroxide 9 - 12 oz/gal.	1000

WASTEWATER SOURCES

Waste Source	Estimated Flow (gpm)	Maximum Flow (gpm)	Average Flow (gpm)	Total Flow (gals/day 24 Hrs.)
Tank 1	5.0	5.0	5.0	7,200
3	4.6	5.0	4.6	6,624
5	5.5	5.5	5.5	7,920
8	15.0	15.0	15.0	21,600
10	5.5	5.5	5.5	7,920
12	5.2	5.2	5.2	7,488
Total Wastewater	40.8 gpm(est.)	41.2	40.8	58,752

First Downstream Sampling Point: 13301

Table E-2.9 Examination Shop 96101

Building No. 133 Drawing Sheet No. 7

Tank Number	Contents	Specific Compounds
1	Varsol	
2	Varsol	
3	Kerosene	
4	Varsol	
5	Varsol	
6	---	
7	---	
8	---	
9	Penetrant ZL2	Hydrocarbon fraction containing fluorescent solids.
10	Emulsifier ZE1	
11	Water	
12	Penetrant ZL2	
13	Emulsifier ZE1	
14	Water	
15	Water	(Not shown on dwg.) Cold Water
16	Water	(Not shown on dwg.) Hot Water

WASTEWATER SOURCES

Water Source	Estimated Flow(gpm)	Total Flow (gals/8hr. Shift)
Tank 11 - Air Jet	3.3	1,584
Tank 14 - Air Jet	3.3	1,584
Tank 15	10.0	4,800
Tank 16	2.0	960
Total Wastewater	18.6 gpm(Est.)	8,928

First Downstream Sampling Point: 13301 8,928 gal/day

Table E-2.10 Examination Shop 96101

Building No. 133 Drawing Sheet No. 8

Tank Number	Contents	Specific Compounds
1	Wet Developer ZP5	Water dispersion of clay type solid particles.
2	Wet Developer ZP5	
3	Not Used	
4	Kerosene	

WASTEWATER SOURCES

Water Source	Estimated Flow(gpm)	Total Flow (gals/8-hr. Shift)
Jet Wash	2.1	1,008
Air & Water		
Total Washwater	2.1 gpm(Est)	1,008

First Downstream Sampling Point: 13301 1,008 gal/day

Table E-3 SUMMARY OF WASTEWATER FLOWS -
DISCHARGES TO STORM DRAINAGE SYSTEM.
STATIONS 13701, 24503, AND 13305

SOURCE OF DISCHARGE	Flow Rate Maximum (gals/min.)	Normal Operating Flow-Average per 8 Hour Shift (gals.)	Anticipated Total Flow-24-Hour Period (gals.)
13701 Storm Sewer:			
137 Building			
Cleaning Shop 93103	18.0	11,000	26,000
Washer Area 93103	43.0	3,000	3,000
Tanks Tubing & Surfaces Shop	40.0	15,000	27,000
Heat Treat Shop	35.0	17,000	50,000
Arc Welding Shop	10.0	4,800	15,000
188 Building	2.0	1,000	3,000
Sub-Total Drainage to Storm Sewer at Station 13701	147	51,800	124,000
24503 Storm Sewer:			
245 Building			
East Corner Manhole	40	2,000	4,000
13305 Storm Sewer:			
South of 133 Building	36	12,000	30,000
TOTAL DISCHARGE TO STORM DRAINAGE SYSTEM	223	65,800	158,000

Table E-3.1 Cleaning Shop 93102

Building No. 137 Drawing Sheet No. 15

Tank Number	Specific Compounds	Tank Volume (gals)
1	Degreaser - Trichloroethylene a 1-1/2" and 1" water cooling line overflow.	60
4	Spray Booth	
5	Caustic Soda Sodium Hydroxide 10 oz/gal	3500
6	Spray Booth	
7	Paint Stripper C-67 Required Alkalinity 25%	3500
8	Stripper (MIL-C-19853A) Methylene Chloride and phenol	500
9	Water Wash Tank	2000
10	Hand Clean Booth Soap and/or detergent, solvant-water bath	
11	Water Wash Station Soap and Water Uses 200 to 300 gallons water per day	
12	Water Wash Dumped once a day	500
13	Wash Station for Turco removal full 1" water flow	

Table E-3.2 Cleaning Shop 93103

Building No. 137 Drawing Sheet No. 16

Tank Number	Contents	Specific Compounds
1	Washer	Soap
2	Washer	Soap
3	Extractor	---
4	---	
5	ZA-28 Zyglo Unit	
6	Magnetic Inspection Unit	

WASTEWATER SOURCES

Waste Source	Estimated Flow (gpm)	Total Flow per 8-hr. Shift(gals)	Total Flow (gals/day)
Solvent & Steam Cleaning	40.0	960	960
1 Washer 2 Washer 3 Extractor	3.0	1,440	1,440
Total Wastewater	43.0 gpm (Est)	2,400 gal/shift	2,400 gals/day

First Downstream Sampling Point: 13701

Table E-3.2 (Cont.) Cleaning Shop 93103

WASTEWATER SOURCES

Waste Source	Estimated Flow (gpm)	Total Flow per 8-hr. Shift(gals)	Total Flow (gals/day)
Tank 12	1 - 32 gpm(Fill & Draw Wash Table)	4,000	8,000
9	13.3	6,400	19,000
13	2.0(hose rinse is periodic)	960	960
Total Wastewater	18.0 gpm(est)	11,360	26,460

First Downstream Sampling Point: 13701

Table E-3.3 Tank, Tubing & Surfaces Shop 93201

Building No. 137		Drawing Sheet No. 20
Tank Number	Specific Compounds	Tank Volume (gals)
1	Water Hydraulic Test	52"x72"x96"
2	Test Stand Oil 1100 (Hydraulic)	50
3	Water	60
4	Water	120
5	Water	100
6	Water	100
7	Water - Linseed Oil Water Jacket Linseed 30 gals	100
8	Varsol Rinse	50 (est)
9	Surjex Unknown - none available at test area	50 (est)
10	Varsol Only a portion of these in Operation.	
11	Varsol Total less than 50 gallons.	
12	Varsol	
13	Varsol	
14	Varsol	
15	Varsol	

Table E-3.3 (Cont.) Tanks, Tubing & Surfaces Shop 93201

WASTEWATER SOURCES

Waste	Estimated Flow(gpm)	Total Flow per 8-hr. Shift(gals)	Total Flow per 24-Hr.Period(gals)
Hydrotest Tank	Dumped once per week		
Total Water Rinse Tanks	40.0	14,800	27,200
Total Wastewater	40.0 gpm(est)	14,800	27,200

First Downstream Sampling Point: 13701

Table E-3.4 **Heat Treat Shop 93212**

Building No. 137 Drawing Sheet No. 21

Tank Number	Specific Compounds
1	Oil
2	Water
3	Water
4	Water
5	Oil Houghton No.2

WASTEWATER SOURCES

Waste Source	Estimated Flow(gpm)	Total Flow per 8-hr. Shift(gals)	Total Flow per 24-hr.Period(gals)
Tank 2	12.5	6,000	18,000
Tank 3	7.5	3,600	10,800
Tank 4	---		
5 Furnace Cooling Water at 3.0 gpm ea.	15.0	7,200	21,600
Total Wastewater	35.0 gpm(est)	16,800	50,400

First Downstream Sampling Point: 13701

Table E-3.5 Arc Welding Shop

Building No. 137 Drawing Sheet No. 24

Tank Number	Specific Compounds - Composition	Tank Volume(gals)
1	Water	400
2	Nitric Acid - 35%	400
3	Caustic Soda 6 - 8 oz/gal.	950

WASTEWATER SOURCES

Waste Source	Estimated Flow(gpm)	Total Flow per 8-hr. Shift(gals)	Total Flow per 24-hr. Period(gals)
Tank 1	(No overflow)		
Electric Welder Water Cooler	10.0	4,800	14,400
Total Wastewater	10.0 gpm(Est.)	4,800	14,400

First Downstream Sampling Point: 13701

Table E-4 GENERAL CHEMICALS PURCHASED - 1968

Solvents	Estimated Annual Purchase
Buildings 245 - 1280 - 424	
Naphtha Aliphatic	13,910 Gallons
Toluene	2,820 "
Acrylic Thinner Ketone & Toluene	5,610 "
Acetate Thinner Cellulose acetate butyrate dope	16,500 "
Nitrate Thinner Ketones, esthers, alcohol and naphtha	6,000 "
Pennsalt 732 Methylene chloride 53% Phenol 14%	540 "
Trichloroethylene	2,340 "
Turco 4737-8 Methylene chloride and phenol	1,800 "
Turco 5122 Methylene chloride and phenol	10,800 "
Alodine Turco 4477 Chomium trioxide 40%	980 Lbs.
MIL-C25543 Water emulsion cleaner	6,500 Gallons
MIL-C-5410 Phosphonic acid, citric acid, detergent, mineral spirits	6,900 "
Varsol	8,200 "
Methyl Ethyl Ketones	1,100 "
Acetones	6,600 "
Building 137	
Varsol	2,500 "

Table E-4 (Cont.) GENERAL CHEMICALS PURCHASED - 1968

Solvents	Estimated Annual Purchase
Building 133	
Varsol	5,000 Gallons
Turco 4008 Strong Alkali with 3-5% phenol	8,000 "
Turco 3823 Methylene chloride phenol	4,000 "
Turco 4338 8% $KMnO_4$ 15% $NaCO_3$ 15% $NaOH$	4,000 "
Borzin Aqua Flux Ortho-dichlorobenzene Soap	4,000 "
Turco Transpo Methylene chloride & phenol	2,000 "
Deodorized Kerosene	200 "
Acetone	500 "
Methyl Ethyl Ketone	700 "
Nitric Acid	570 Lbs.
Hydrochloric Acid	
Sulfuric Acid	
Steam Cleaning Compound 4998	500 Gallons
Calibration Fluid (Heptane)	275 "

GENERAL OUTLINE FOR THE PREPARATION OF AIRCRAFT FOR FINAL PAINTING

These preparations are for general cleaning, corrosion removal and surface treatment of aluminum and magnesium alloys.

Magnesium and aluminum surfaces are subjected to corrosion attack even under painted surfaces by moisture, salt water, salt air and other operational environments. Paint and/or other protective coatings should be applied as soon as possible after the final chemical surface treatment.

Precleaning:

Bare magnesium surfaces should have all oil and grease removed, using solvent-emulsion cleaner or water emulsion cleaner or steam cleaning compounds. These compounds can be applied by pressure nozzles with brushing and mopping. Allow to soak 10-15 minutes, but not dry on the surface - then rinse thoroughly with clean water until all traces of cleaning compounds and dirt are removed.

Painted surfaces of magnesium and all aluminum should have paint removed, using a paint remover (MIL-R 8633) containing chlorinated hydrocarbon (methylene chloride), cresols, amines, ammonia, thinners, and emulsifiers. This material can be sprayed or brushed on the surface to be cleaned, and then rinsed with clear water. Oil, grease and operational films should be removed the same as magnesium metal surfaces.

Corrosion Removal:

On both magnesium and aluminum surfaces, heavy corrosion residues should be removed by abrasive blast cleaning. Lighter corrosion residue on magnesium can be removed by a 10 percent chromic acid or for aluminum by (MIL- C 5410), phosphoric-citric acid and Stoddard Solvent mixed 1 to 1 or with water mixed 1 to 1. In both cases the solutions react with the corrosion residue, and the surface is rinsed clean with water until all residue and chemicals are removed. These compounds (phosphoric-citric acid or chromic acid) must be kept away from all operating mechanisms, seams and cracks as well as plated steel.

After paint has been removed from aluminum and/or magnesium surfaces, rinsed clean and dried, traces of primer that might exist around rivet heads, etc., should be removed by wiping with thinner dope and lacquer (cellulose nitrate) TT-T266 or cellulose acetate butyrate dope thinner MIL T-6096.

Immediately following the removal of all corrosion residues, (1) magnesium surfaces are chemically treated with Type-I chrome pickle (1.5 lbs. sodium dichromate, 1.5 pints of nitric acid made up to one gallon with water), and (2) aluminum surfaces are chemically treated with MIL C-5541 or alodine 1200 solution (Turco 4477 - 40% CrO_3) (28-1/2 lbs. alodine 1200, six pints nitric acid made up to 150 gallons with water).

Cleaning Prior to Painting:

Prior to the application of paint finishes, the aircraft should be thoroughly clean and free from comtaminates. Therefore, upon completion of the surface treatment and reassembled, the aircraft is moved into a booth or other area suitable for painting operations - the doors or entrances closed. The area where painting is done should be free of dirt, dust, lint, etc., as possible. All men touching the plane should ware white gloves or use cheesecloth. The plane should be allowed to dry and free of water drippage before painting. One hour before painting, any remaining chromic acid (alodine 1200) solution should be removed by wiping the entire surface with clean cheesecloth damp with clean water and dried with clean cheesecloth. Bottom surfaces are checked for both water or other drips. These should be removed by blotting with cheesecloth or removed by blotting with cheesecloth moistened with toluol or lacquer thinner.

If aircraft surfaces are allowed to become contaminated prior to final painting, the surface should be recleaned by using aqueous solutions of MIL- C 22543 (liquid emulsifying agent containing soap and water) or steam cleaning with MIL C-22542 (high pressure cleaner containing emulsifiers, solvents, silicates, phosphates, corrosion inhibitors and water). Keep spray moving to prevent overheating the surface skin. All residues should be flushed off with hot or cold water. The cleaned surfaces should be subjected to a water break test.

All joints and fasteners should be blown out with oil and water free air before the solvent wipe down using clean cheesecloth moistened with lacquer thinner (TT-T-266).

APPENDIX F

Pollution Abatement Plant

U. S. Marine Corps Air Station
Cherry Point, North Carolina

Bernard R. Sacks, Chemical Engineer
Water, Sewage and Industrial Waste Section
National Field Investigations Center
Federal Water Pollution Control Administration

APPENDIX F

POLLUTION ABATEMENT PLANT MARINE CORPS AIR STATION, CHERRY POINT, N.C.

INTRODUCTION

This appendix contains the procedures and findings for the operation of the Pollution Abatement Plant during the period December 4 - 13, 1968.

PHYSICAL DESCRIPTION

HOLDING TANK

The waste (Figure F-1) entered the Pollution Abatement Plant and received oil separation in the holding tank. The tank was essentially a concrete box (16 ft. x 20 ft. x 10 ft.) with a baffled overflow at the end opposite the inlet. The tank provided effective removal of oil and paint skins. However, this floating material had to be pumped into a tank truck for disposal. The tank had to be drained to remove any sludge accumulation.

The holding tank had an adjacent oil sump for collection of oil and paint skins. With the high flow conditions, the level in the holding tank was above the weir elevation of the sump. This caused the sump to be filled and unusable and there was a discharge to the bypass line at the overflow of the holding tank.

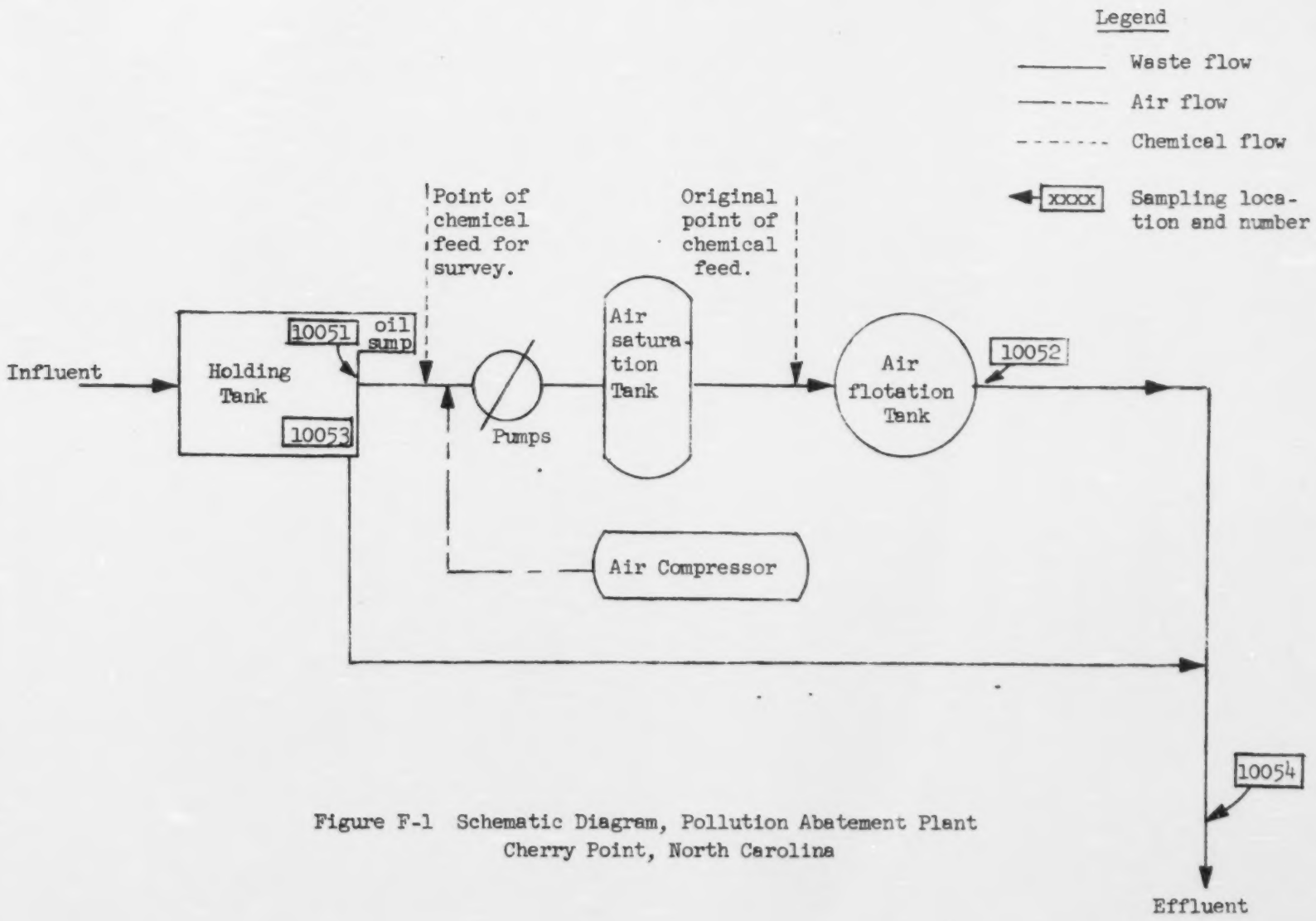

Figure F-1 Schematic Diagram, Pollution Abatement Plant
Cherry Point, North Carolina

WASTE PUMPS AND AIR INJECTION

The Pollution Abatement Plant had two waste pumps (rated at 75 gpm each) operating separately to transport waste from the holding tank. Compressed air at 100 psi was reduced to near atmospheric pressure and injected into the pump suction line. During the December survey, one pump was inoperable with a bad bearing.

CHEMICAL FEED

The treatment plant was designed for adding chemicals to the inlet of the air flotation tank. The point of chemical feed was changed during the survey to the suction line of the waste pump to facilitate more efficient mix and floc growth. The chemical feed pumps were not required with this point of injection.

AIR FLOTATION

The wastes were pumped through the air saturation tank and into the air flotation tank inlet located in the center, 3 feet above the bottom. The effluent from the flotation tank was taken off 2 feet above the bottom through a collector ring at the periphery of the tank. The treated effluent joined the wastes overflowing the holding tank.

The flow rate through the tank was limited in order to keep the surface level below the scum overflow. For most of the survey this was accomplished at a flow rate of 55 gpm. However, when the

collecting ring was cleaned the flow rate was increased to 75 gpm, lasting less than a day.

TIME OF PASSAGE STUDY

With the flow at approximately 55 gpm, dye was injected into the system at the point where the chemicals were added. Dye reached the point of sampling ahead of the air flotation tank, 2 to 2-1/2 minutes after injection. The first noticeable effect of dye in the effluent of the air flotation tank was eight minutes after dye injection. Some dye was noticeable after one hour but the majority of the dye had passed in the period of 8 to 25 minutes after injection. The main peak of the dye appeared at the weir box (Sta. 10054) approximately 21 minutes after injection into the system.

SAMPLING PROCEDURES

Four sampling locations were established. All sampling locations were set up with automatic samplers to collect three 8-hour composite samples over a 24-hour period. Composites were collected to coincide with the shift changes at NARF.

STATION 10051

Station 10051 was at the influent to the chemical treatment facilities at the point of pump suction. These samples were collected on a constant volume basis for each period. The constant volume type of sample was chosen because the flow through the treatment facilities was to be kept constant. The wastes at this point had received some treatment, that is oil and paint skin separation, in the holding tank. A recording of pH and surface scatter turbidity measurements were made during the sampling cycle. The results of the sampling for this station are shown in Appendix D, Tables D-29 and D-30.

STATION 10052

Station 10052 was the effluent line from the air flotation tank. These samples were collected in the same manner as Station 10051, with a constant volume sampler. Surface scatter turbidity and pH measurements were made on the wastes at various times.

The results of the sampling for this station are shown in Appendix D, Tables D-31 and D-32. Comparison of the data from

Stations 10051 and 10052 indicates reductions due to the operation of the treatment facilities.

STATION 10053

Station 10053 was at the effluent from the holding tank. These samples were collected proportional to the total flow through the system, that is, the discharge through the air flotation tank plus the holding tank overflow. The results of the sampling for this station are shown in Appendix D, Table D-34.

STATION 10054

Station 10054 was at the point where the total effluent discharged from the Pollution Abatement Plant. This included the holding tank overflow and treated effluent from the air flotation tank. Sample collection at this point was proportional to flow. The results of the sampling for this station are shown in Appendix D, Table D-35. This station was designated Station 25 during the September - October survey and the results of the sampling are shown in Appendix D, Table D-20.

POLLUTION ABATEMENT PLANT OPERATING PROCEDURES

The operation of the Pollution Abatement Plant treatment facilities for this survey began around 0800, December 6, 1968 and continued through 2400, December 12, 1968.

DECEMBER 6, 1968 AT 0800 TO DECEMBER 7, 1969, 2400

During this period the operation of the treatment facilities was irregular. No air was added and the point of chemical addition was in the waste line immediately entering the air flocation tank. Different amounts of chemicals were added, both through this line and directly into the tank. The chemical addition consisted of alum, soda ash and/or lime. However on checking the effluent after the sample was mixed slowly in the jar test machine a floc would grow.

DECEMBER 8, 1968, 0000 TO DECEMBER 10, 1968, 0800

During this time the treatment consisted of air without chemicals. The amount of air added was approximately 0.05 cfm. It was attempted to keep the flow constant, however, it did vary between 55 and 75 gpm.

DECEMBER 10, 1968, 0800 TO DECEMBER 11, 1968, 1600

During this period the treatment consisted of the addition of soda ash, alum and air. The addition of air was at the rate of 0.05 cfm.

The point of chemical addition during this period, and the rest of the survey, was in the suction line of the pump from the holding tank. The chemical additions were at the rates shown in Table F-1.

The injection of air was downstream from the point of the chemical addition. The pump provided complete mixing for the system. The wastes then flowed through the air saturation tank and into the air flotation unit. In the line just prior to entering the air flotation tank, the wastes were sampled and a determination of floc characteristics made, indicating if a change in rate of chemical addition was needed. The main controlling factor in this case was the pH.

It appeared that the optimum pH for this mixture was around 7.2. When the pH was between 8 and 9, the buildup of floc and skimming materials was excessive. In fact, at this point the overflow trough for the skimmable material would clog and would have to be washed out. Above a pH of 9.0, the wastes would become very cloudy. At this pH sodium aluminate would become soluble, redissolving as wastes.

DECEMBER 11, 1968, 1600 TO DECEMBER 12, 1968, 2400

During this period the treatment consisted of the addition of alum, soda ash and ferrous sulfate along with air. The addition of the chemicals was at the same point as in the previous period and the feed rates were as shown in Table F-2.

Table F-1.

FEED RATES (pound chemical/hour)

Date	Time Period	Alum	Soda Ash
12/10/68	0800 - 1300	Continually Changing	
	1300 - 1900	5.64	1.62
	1900 - 2400	1.66	0.42
12/11/68	0000 - 0800	1.66	0.42
	0800 - 1600	9.93	2.98
	Weighted Average	4.99	1.45

Table F-2.

FEED RATES (pound chemical/hour)

Date	Time Period	Alum	Soda Ash	Ferrous Sulfate
12/11/68	1600 - 2400	1.14	0	1.81
12/12/68	0000 - 0800	1.02	0	0.62
	0800 - 1100	5.24	2.08	1.66
	1100 - 1600	6.04	8.38	0.50
	1600 - 2400	1.18	0.36	0.93
Weighted Average		2.27	1.59	1.07

The foaming problem was not as evident during this period as it was in the previous one, probably because the addition of alum was less than one-half that previously added. There was carryover of some iron in the effluent.

DISCUSSION OF TREATMENT OPERATIONS

The treatment operation did not progress satisfactorily during the initial period when the addition of chemicals varied. The point of chemical addition in the system did not allow sufficient time for mixing, floc growth and separation.

During the period when the treatment consisted only of the addition of air, there was some foam removal. From a visual observation, it appeared that the removal of organic matter and metals was low because the turbidity in the effluent had not been reduced. However, the addition of air provided mixing and flotation in the tank. There was an 11 percent reduction in COD and 1.3 percent reduction in phenols through the treatment facilities (Table F-3). However, the oil content in the effluent was 84 percent greater than in the influent. This might be attributed to the rotating motion of the tank contents which was caused by the air. The rotation dispersed some of the oil and grease that had settled out previously. The chromium was increased 3 percent.

Table F-4 shows the computed concentrations of chemicals in the air flotation tank. The chemical feed was varied to control pH and build a floc in order to obtain a clear effluent. Changing the concentration of one chemical would require the subsequent variation in the other chemicals controlling pH. Because of the variation in the incoming waste, it was impossible to establish one optimum chemical feed rate.

Table F-3.

AVERAGE REDUCTIONS THROUGH TREATMENT PLANT (%)

Chemicals	COD	Phenol	Total Oil	Total Cr.
Air	10.8	1.3	-83.9*	-3.0*
Air Alum Soda Ash	26.8	19.7	44.9	4.2
Air, Alum Soda Ash Ferrous sulfate	- 8.6*	8.6	58.8	42.4

* Not a reduction but a percentage increase over influent concentrations.

Reference - Appendix D, Table D-33.

Table F-4.

CONCENTRATIONS OF CHEMICAL ADDITIONS (mg/l)

Date	Time Period	Alum	Soda Ash	Ferrous Sulfate
12/10/68	1300 - 1900	190	54	---
	1900 - 2400	55	14	---
12/11/68	0000 - 0800	55	14	---
	0800 - 1600	330	99	---
	Weighted Average	170	48	---
	1600 - 2400	38	0	60
12/12/68	0000 - 0800	34	0	21
	0800 - 1100	180	69	55
	1100 - 1600	200	280	17
	1600 - 2400	39	12	31
	Weighted Average	76	53	36

There was a reduction in COD, phenol, total oil and total chromium when soda ash, alum and air were added. The average reductions obtained with these three chemicals were 27, 20, 45 and 4 percent for COD, phenol, oil and chromium respectively. However, the concentration of COD and total oil were higher in the influent than during the previous treatment period.

When the treatment consisted of alum, soda ash and air (Table 3) there were better reductions than using air alone, but when comparing the effectiveness of using ferrous sulfate, alum, soda ash and air, the reductions were better for total oil and total chromium but less for COD and phenol.

The maximum reductions during the entire survey for COD, phenol, total oil and total chromium were 54, 50, 95 and 57 percent respectively (Appendix D, Table D-33). These reductions indicate that the treatment facility can be operated. However, the fluctuation in the reductions over the treatment cycles indicate that the optimum reductions would be difficult to maintain.

JAR TESTS

A series of seven jar tests were run on two 8-hour influent composite samples. The jar tests were run to observe the amount of waste reduction with chemical treatment and sedimentation without flotation.

The chemicals were added to a sample, given a quick mix, followed by a slow mix for one-half hour. At this point, the supernatant was decanted from the floc or settled material that remained in the jar. The concentration and variation of chemicals added is shown in Table F-5. A part of the same influent sample was used in Jar Tests 1 through 4, while a second influent sample was used for Jar Tests 5 through 7 (Table F-6). The reductions of COD, phenol, total oil and total chromium (Table F-7) vary for the seven jar tests and show no consistency. However, the fluctuation in percent reductions show that the waste could be treated using chemical treatment with sedimentation and strict operational control.

Table F-5.

CHEMICAL ADDITIONS FOR JAR TESTS (mg/l)

Jar Test	Soda Ash	Lime	Alum	Ferrous Sulfate
1	200		200	
2	150		100	200
3	100		150	100
4		100	200	100
5	120		140	60
6		250	200	60
7	200		100	

Table F-6.

CHARACTERISTICS OF WASTE SAMPLES USED FOR JAR TESTS (mg/l)

Jar Test Nos.	COD	Phenol	Total Oil	Total Chromium
1, 2, 3, 4	830	59	130	0.9
5, 6, 7	410	34	74	1.3

Table F-7.

REDUCTIONS OBTAINED WITH JAR TESTS (%)

Jar Test	COD	Phenol	Total Oil	Total Cr
1	24.1	nil	49.2	nil
2	24.1	nil	40.0	nil
3	22.9	nil	60.8	nil
4	30.1	nil	83.8	67
5	43.9	2.9	75.7	77
6	14.6	5.9	31.1	nil
7	43.9	5.9	58.1	46

SUMMARY

The results of the operations of the treatment plant during the period December 3 - 12, 1968, indicate that the incoming wastes were erratic. There was good separation of oil and paint skins in the holding tank. The short-circuiting conditions were unknown.

The chemical treatment of these wastes would require 24-hour supervision. The wastes can be chemically treated with either air flotation or sedimentation.